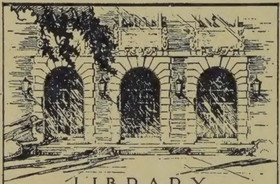

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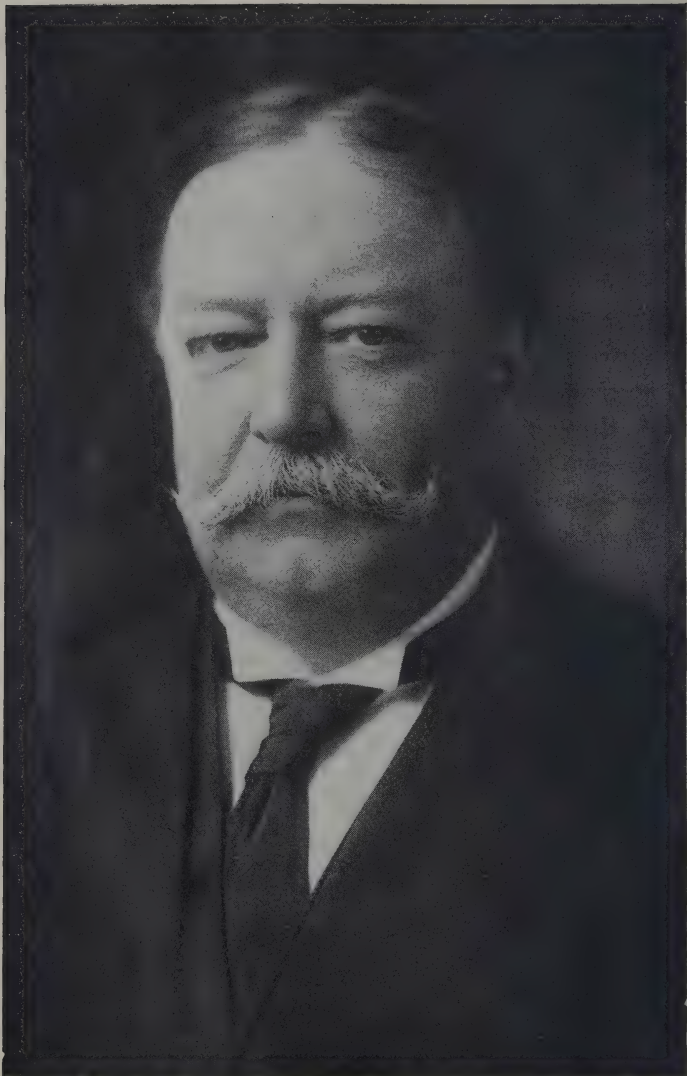

Hon. William Howard Taft

Formerly Chairman, Board of Directors Life Extension Institute, Inc.

HOW TO LIVE

RULES FOR HEALTHFUL LIVING BASED ON MODERN SCIENCE

AUTHORIZED BY AND PREPARED IN COLLABORATION WITH THE HYGIENE REFERENCE BOARD OF THE LIFE EXTENSION INSTITUTE, INC.

BY

IRVING FISHER, *Chairman,*
PROFESSOR OF POLITICAL ECONOMY, YALE UNIVERSITY

AND

EUGENE LYMAN FISK, M.D.,
MEDICAL DIRECTOR OF THE INSTITUTE

SEVENTEENTH EDITION

FUNK & WAGNALLS COMPANY
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FOREWORD

TO THE FIRST EDITION

To one who has been an eye-witness of the wonderful achievements of American medical science in the conquest of acute communicable and pestilential diseases in those regions of the earth where they were supposed to be impregnably entrenched, there is the strongest possible appeal in the present rapidly growing movement for the improvement of physical efficiency and the conquest of chronic diseases of the vital organs.

Through the patient, intelligent and often heroic work of our army medical men, and the staff of the United States Public Health Service, death-rates supposedly fixt have been cut in half.

While it is true that to the public mind there is a more lurid and spectacular menace in such diseases as smallpox, yellow fever and plague, medical men and public health workers are beginning to realize that, with the warfare against such maladies well organized, it is now time to give attention to the heavy loss from lowered physical

efficiency and chronic, preventable disease, a loss exceeding in magnitude that sustained from the more widely feared communicable diseases.

The insidious encroachment of the chronic diseases that sap the vitality of the individual and impair the efficiency of the race is a matter of increasing importance. The mere extension of human life is not only in itself an end to be desired, but the well digested scientific facts presented in this volume clearly show that the most direct and effective means of lengthening human life are at the same time those that make it more livable and add to its power and capacity for achievement.

Many years ago, Disraeli, keenly alive to influences affecting national prosperity, stated: "Public health is the foundation on which reposes the happiness of the people and the power of a country. The care of the public health is the first duty of a statesman." It may well be claimed that the care of individual and family health is the first and most patriotic duty of a citizen.

These are the considerations that have influenced me to cooperate with the life extension movement, and to commend this volume to the earnest consideration of all who

desire authoritative guidance in improving their own physical condition or in making effective the knowledge now available for bringing health and happiness to our people.

WM. H. TAFT.

New Haven, June 12, 1915.

FOREWORD

TO THE FIFTEENTH EDITION

Since the foregoing words were written the entire power of our country has been mobilized in defense of human liberties. This great peace-loving nation has proved its strength against a formidable war-making nation.

At the foundation of national strength lies human vitality. That is, underneath our power to furnish the money, munitions, food, ships, machinery and morale which won the war we find the great fundamental requirement of sound bodies and minds.

The test of war, however, revealed the startling degree of physical insufficiency that characterizes civilized man all over the world. According to General Crowder's report, close to 35 per cent. of the men called in the draft were disqualified for active military service because of physical defects. These did not by any means include all who had physical impairments; for many were accepted with certain forms of serious infection which could be treated at the camps. These figures square with those reported for several years past by

the Life Extension Institute on the basis of its examinations of large groups of supposedly healthy people. This coincidence is only one of several where the conclusions of the Institute, as exprest in the earlier editions of this book, anticipated lessons suddenly thrust upon us by the war and as suddenly crystalized into accepted knowledge.

Thus we have, as a by-product of a terrible and devastating war, the revelation of a great national need and, in consequence, a new and lively interest in human vitality and efficiency. It is now, as never before, the evident and urgent duty of all citizens to make themselves in the highest degree fit.

The principles of individual hygiene which have been applied in the training and guidance of the soldier should also be imprest upon the civilian. Our full strength is demanded to "carry on" through the post-war problems of reconstruction.

I therefore commend anew this book to the earnest attention of our people at a time when, as a nation, we are turning from the destructive, life-destroying activities of war to the constructive, life-renewing activities of peace.

WM. H. TAFT.

Washington, D. C., Dec. 5, 1918.

PREFACE

It gives the authors and the Hygiene Reference Board, who have cooperated in writing this book, great satisfaction to find that within three years it has passed through fourteen editions, reaching a total of over one hundred thousand copies, and that its usefulness is still on the increase.

It has been used as a text-book of hygiene in the University of California, Yale, Mills College, and elsewhere. Physicians and laymen alike have bought it in numbers for distribution among their friends or patients. A special edition was printed for, and circulated by, the *Oregon Journal*. A Japanese edition has been produced and translations not yet published have been, or are being made in French, German, Italian, Dutch and Chinese. A Spanish translation has been made by the National Committee of Physical Education, an official organization appointed by the President of Uruguay, and published in their official organ, "Uruguay Sport."

There seem to be three chief reasons for the success of the book. One is, that unlike any previous book on the obscure and only partially developed science of individual hygiene, it represents not simply the opinion of one man but the composite judgment of more than ninety leading authorities on the subject in all its branches. A second reason is that the readers of the book find in it something new and contrary to conventional ideas, for the authors decided at the outset to show the courage of their convictions and of those of the whole Hygiene Reference Board. Even where certain members of the Board would have preferred, because of life-long habits of extreme scientific conservatism, to refrain from changing their own personal customs and those of the people, as for instance in regard to alcohol, tobacco, tea, and coffee, the book has consistently and unhesitatingly given the conclusions of physiological science instead of taking counsel of tradition or of easy compromises with accepted indulgences. The third reason is that those who have bought and distributed this book have had the satisfaction of knowing that its royalties went not into private pockets but into the philanthropic activities of the Life Extension Institute.

One of the most important measures of this type financed by these royalties is the circular of information for men rejected in the draft, which has been prepared by the Institute, issued by the U. S. Public Health Service, and placed in all the draft boards with the approval of the Provost Marshal General.

Also a considerable distribution has been made of the book, "Health for the Soldier and Sailor," which contains in addition to material from the book "How to Live," chapters on personal hygiene in the camp and in military service.

This latter book, by order of the Surgeon-General of the Navy, has been placed in all of the Naval Libraries, and has, with the co-operation of the publishers, been distributed to the medical officers and lay officers of certain rank in the Army and Navy.

The book, "How to Live," embodies the central idea of the Institute, which is to analyze, criticize and correct current habits of living. That these are radically wrong in many particulars and are responsible for an untold amount of harm, misery, and a vast number of premature deaths, was suspected by the authors several years ago on the basis of such fragmentary data as was

then available. That these suspicions were only too well justified was demonstrated by the enormous number of impairments found among apparently well people examined by the Institute. These findings, greeted at first with incredulity even by some public health experts and physicians, have been confirmed on a vast scale by the results of the medical examinations of registrants in the draft and volunteers.

At last the country is awake on this subject. Millions of people now realize that our national strength, in war or peace, is, in the last analysis, a matter of human vitality, and in consequence a new and livelier interest is being manifested in physical training, diet, and a well-ordered life. The striking improvement through physical training and corrective measures among men found unfit for service, but sent to the camps for treatment and upbuilding, and the remarkable physical change among the young men in camp who have been accepted, have received wide comment.

This new attitude of the public mind is making far easier the work of the Institute in urging the vital importance, both from the personal and from the civic point of view, of periodic medical examinations, of

earlier and wider application of preventive medicine, and of a franker, fuller and more enthusiastic acceptance of modern physiological science where, as is frequently the case, it is found at variance with ancient social traditions.

Already as by-products of the war, certain principles which seemed radical at the time they were presented in the earlier editions of this book, are now accepted by physiological science and medical science and even by the mass of the public as well-established truths, namely, the low protein standard in diet, the excessive food indulgence of the average adult, the profound influence of focal infection, especially mouth infection, in causing chronic disease.

The authors will welcome comment and criticism, but caution all who are disposed to question its material, especially scientific men, that beneath its popular form there lies first-hand scientific information and research and a certain sifting of the material by the Hygiene Reference Board.

That so little change, except in the way of additional evidence and stronger emphasis on most of the principles set forth in earlier editions and collected in the present edition,

has been necessary, is evidence of the close contact with the movement of scientific thought attained by the association with the Hygiene Reference Board.

IRVING FISHER,
EUGENE LYMAN FISK.

NOTE.—Since the previous edition of this book a mortality study has been made by the Metropolitan Life Insurance Company of policyholders examined in 1914 and 1915 by the Life Extension Institute. There was found a reduction in the death rate of 28% in a period of five years in the group examined, and a reduction of 67% in the death rate in the group showing important impairments. This affords well-tested, scientific evidence of the value of the measures advocated in this book, *i.e.*, periodic examination of the life and body, the correction of physical defects and the practical application of the rules of right living.

May 1st, 1922.

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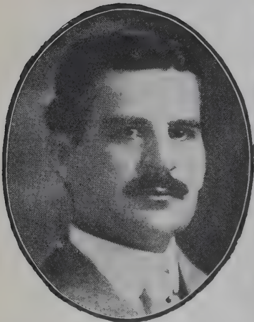

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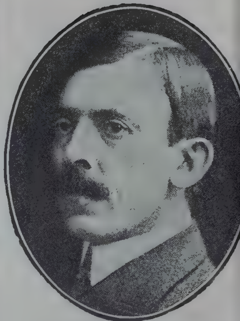

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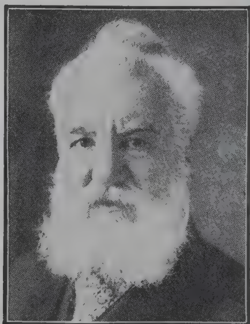

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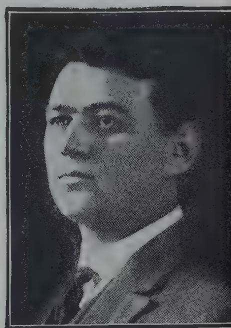

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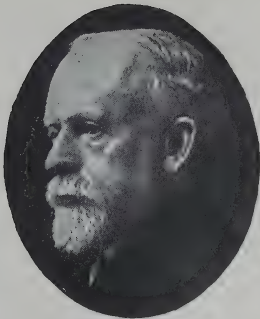

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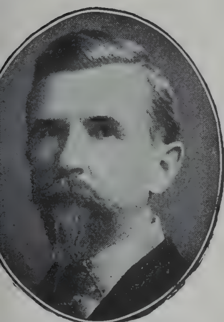

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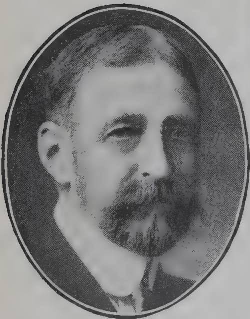

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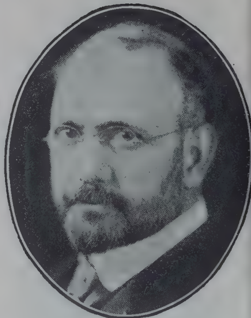

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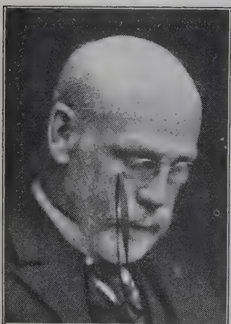

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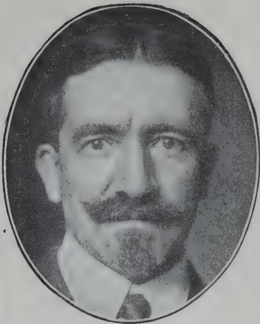

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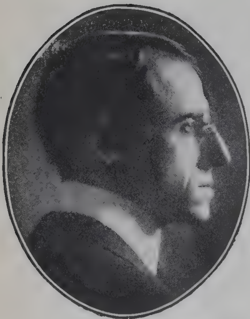

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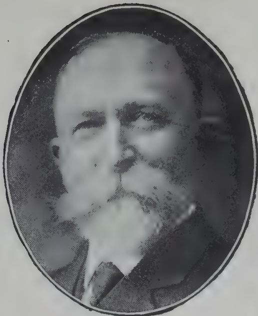

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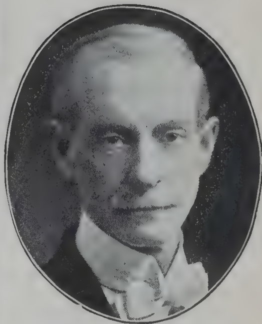

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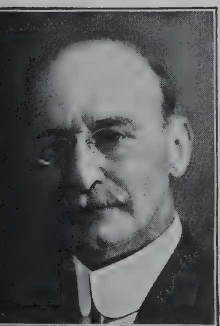

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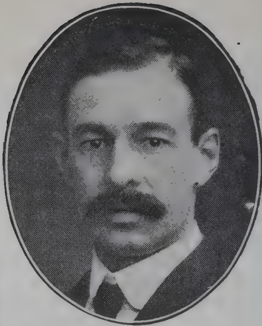

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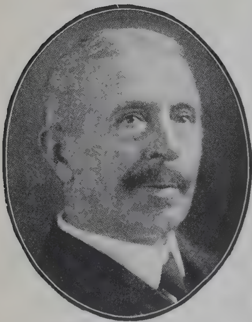

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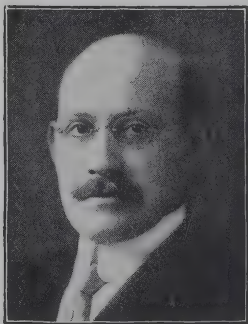

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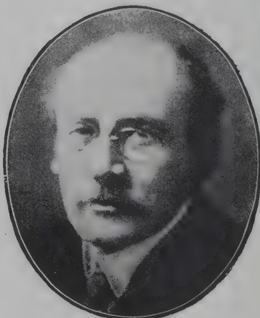

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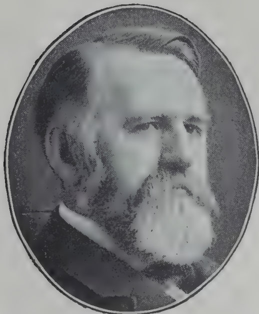

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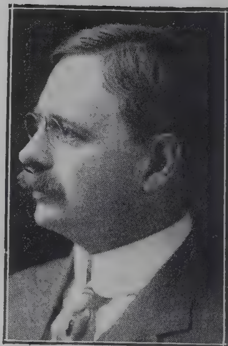

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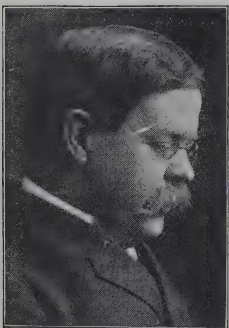

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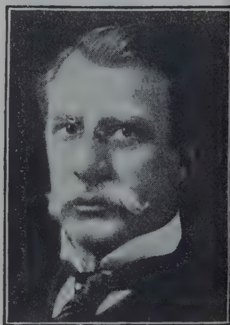

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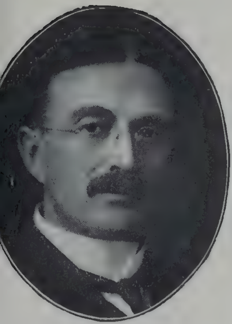

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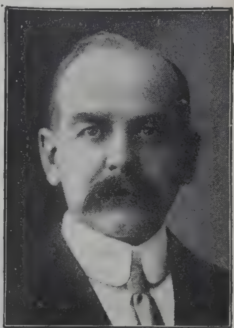

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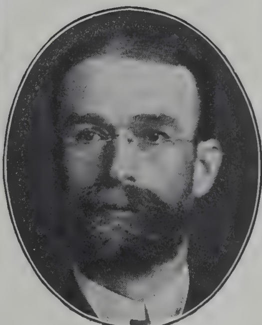

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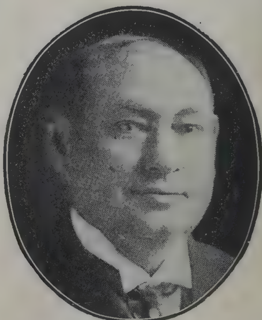

Dr. Harvey W. Wiley

HOW TO LIVE

INTRODUCTION

The purpose of the Life Extension Institute embraces the extension of human life, not only as to length, but also, if we may so express it, as to breadth and depth. It endeavors to accomplish this purpose in many ways, but especially through the promotion of individual hygiene.

Thoroughly carried out, individual hygiene implies high ideals of health, strength, endurance, symmetry, and beauty; it enormously increases our capacity to work, to be happy, and to be useful; it develops, not only the body, but the mind and the heart; it ennobles the man as a whole.

Medieval Ideals

We in America inherit, through centuries of European tradition, the medieval indifference to the human body, often amounting to contempt. This attitude was a natural outgrowth of the theological doctrine that the "flesh is in league with the devil" and hence is the enemy of the soul. In the

Middle Ages saintliness was often associate with sickliness. Artists, in portraying saints often chose as their models pale and emaci ated consumptives.

We are beginning to leave this false tradi tion behind and are working toward th establishment of more wholesome ideals. I is probably true, for instance, that the ma or the woman who is unhealthy is now handi capped in opportunities for marriage, th public attitude toward which may be con sidered an index to the ideals of society.

The Present Health Movement

A great health movement is sweeping ove the entire world. Hygiene has repudiate the outworn doctrine that mortality i fatality and must exact year after year fixt and inevitable sacrifice. It aims instea to set human life free by applying moder science. Science, which has revolutionize every other field of human endeavor, is a last revolutionizing the field of health con servation.

Medical Practise

The practice of medicine, which for age has been known as the "healing art," is un dergoing a gradual but radical revolution This is due to the growing realization tha an ounce of prevention is worth a pound o cure. As teachers and writers on hygiene as trainers for college athletes, as adviser

or the welfare departments of large indusrial plants, and in many other directions, hysicians are finding fields for practising reventive medicine. Even the family phyician is in some cases being asked by his atients to keep them well instead of curing hem after they have fallen sick.

Furthermore, the preventive methods of nodern medicine are being applied by the eople themselves, as witness the great ogue to-day of sleeping out of doors; the opularity, not always deserved, of health oods and drinks; the demand for unconaminated water supplies, certified milk, inpected meat and pure foods generally; the vorld-wide movement against alcohol; and he legislation for health insurance as well s to correct wrong conditions of labor and o safeguard the laborer.

Labor itself to-day is being held in honor, nd idleness in dishonor. Ideals are being hifted from those of "leisure" to those of 'service." Work was once considered simly a curse of the poor. The real gentleman vas supposed to be one who was able to live vithout it. The king, who set the styles, was nvied because he "did not have to work," ut had innumerable people to do work for im. His ability to work, his efficiency, his

endurance, were the last things to which he gave consideration. To-day monarchs (the few that are left), and presidents are trying to find out how they can keep in the fittest condition and accomplish the greatest possible amount of work. Even among society women, some kind of work is now "the thing."

The exigencies of war have given a new and powerful impulse to these tendencies. The military ideal includes vigorous health of muscle and nerve and military ideals are affecting the lives of us all. Physical and military training are coming to be required for school children and sought after by the middle-aged who are suddenly realizing, to their chagrin, how unfit they are to render military service to their country.

High Ideals

One of the most satisfying tasks for any man or woman to-day is to take part in this movement toward truer ideals of perfect manhood and womanhood. Our American ideals, tho improving, are far inferior to those, for instance, of Sweden; and these, in turn, are not yet worthy to be compared with those of ancient Greece, still preserved for our admiration in imperishable marble. With our superior scientific knowledge, our health ideals ought, as a matter of fact, to excel those of any other age. They should

not stop with the mere negation of disease, degeneracy, delinquency, and dependency. They should be positive and progressive. They should include the love of a perfect muscular development, of integrity of mental and moral fiber.

There should be a keen sense of enjoyment of all life's activities. As William James once said, simply to live, breathe and move should be a delight. The thoroughly healthy person is full of optimism; "he rejoiceth like a strong man to run a race." We seldom see such overflowing vitality except among children. When middle life is reached, or before, our vital surplus has usually been squandered. Yet it is in this vital surplus that the secret of personal magnetism lies. Vital surplus should not only be safeguarded, but accumulated. It is the balance in the savings bank of life. Our health ideals must not stop at the avoidance of invalidism, but should aim at exuberant and exultant health. They should savor not of valetudinarianism, but of athletic development. Our aim should be to see not how much strain our strength can stand, but how great we can make that strength. With such an aim we shall, incidentally and naturally, find ourselves accom-

plishing more work than if we aimed directl at the work itself. Moreover, when suc ideals are attained, work instead of turnin into drudgery tends to turn into play, an the hue of life seems to turn from dull gra to the bright tints of well-remembered child hood. In short, our health ideals should ris from the mere wish to keep out of a sick bed to an eagerness to become a well-sprin of energy. Only then can we realize the in trinsic wholesomeness and beauty of huma life.

CHAPTER I

AIR

Section I—Housing

Air is the first necessity of life. We may live without food for days and without water for hours; but we can not live without air for more than a few minutes. Our air supply is therefore of more importance than our water or food supply, and good ventilation becomes the first rule of hygiene.

Living and working rooms should be ventilated both before occupancy and while occupied.

It must be remembered that the mere construction of the proper kind of buildings does not insure ventilation. We may have model dwellings, with ideal window-space and ventilating apparatus, but unless these are actually used, we do not benefit thereby.

Features of Ventilation

The most important features of ventilation are motion, coolness, and the proper degree of humidity and freshness.

Drafts

There is an unreasonable prejudice against air in motion. A gentle draft is, as a matter of fact, one of the best friends which the

seeker after health can have. Of course, a strong draft directed against some exposed part of the body, causing a local chill for a prolonged time, is not desirable; but a gentle draft, such as ordinarily occurs in good ventilation, is extremely wholesome.

Air and Catching Colds

It goes without saying that persons unaccustomed to ventilation, and consequently over-sensitive to drafts, should avoid over-exposure while they are in process of changing their habits. One must always use common sense and never grow foolhardy. It is never advisable that a person in a perspiration should sit in a strong draft. But after even a few days of enjoyment of air in motion, with cautious exposure to it, the likelihood of colds is greatly diminished; and persons who continue to make friends with moving air soon become almost immune to colds.

The popular idea that colds are derived from drafts is greatly exaggerated. A cold of any kind is usually a catarrhal disease of germ origin, to which a lowered vital resistance is a predisposing cause. The germs are almost always present in the nose and throat. It is exposure to a draft plus the presence of germs and a lowered resistance of the body which produces the usual cold.

Army men have often noted that as long as they are on the march and sleep outdoors, they seldom or never have colds, but they develop them as soon as they get indoors again.*

Windows

The best ventilation is usually to be had through the windows. We advise keeping windows open almost always in summer; and often in winter.

One should have a cross-current of air whenever practicable; that is, an entrance for fresh air and an exit for used air at opposite sides of the room. Where there can not be such a cross-current, some circulation can be secured by having a window open at both top and bottom.

Window-boards

In winter, ventilation is best secured by means of a window-board. This is a board the edge of which rests on the edge of the window-sill, the ends being attached firmly to the window-frame. It affords a vertical surface three or four inches high and situated three or four inches in front of the window, so as to deflect the cold air upward when the window is slightly open. The air will then reach the breathing-zone, instead of flowing on to the floor and chilling the feet, which is the usual consequence of open-

* See SUPPLEMENTARY NOTES, "Avoiding Colds."

ing a window in winter. It seems tragic to think that for lack of some such simple device, which any one can make or buy, there is now an almost complete absence of winter ventilation in most houses.

When coal conservation is essential a partial substitute for ventilation can be secured by an electric fan which, if properly situated, will reclaim for use the warmed air constantly accumulating at the ceiling.

Air-fans

Air should never be allowed to become stagnant. When there is no natural movement in the air, it should be put in motion by artificial means. Even a hand fan is of distinct hygienic value.

Heating Systems

A wood or grate fire is an excellent ventilator. A heating-system which introduces warmed new air is better than one acting by direct radiation, provided the furnace is well constructed and gas-proof.

Cool Air

The importance of coolness is almost as little appreciated as the importance of motion. Most people enervate themselves by heat, especially in winter. The temperature of living-rooms and work-rooms should not be above 70 degrees, and, for people who have not already lost largely in vigor, a temperature of 5 to 10 degrees lower is preferable. Heat is depressing. It lessens both

mental and muscular efficiency. Among the employees of a large commercial organization in New York who were examined by the Life Extension Institute, some of the men in one particular room were suffering from an increase of body temperature and a skin rash. On investigation it was found that the room in which they worked was overheated. There was no special provision for ventilation. A window-board was installed, with the result that the men recovered and no other cases of skin rash occurred in that room.

Dry Air

As to dryness of air, there is little which the individual can do except to choose a dry climate in which to live or spend his vacations. Unfortunately, there is not as yet any simple and cheap way of drying house air which is too moist, as is often the case in warm weather.

Humidity

In the cold season, indoor air is often too dry and may be moistened with advantage. This may be done, to some extent, by heating water in large pans or open vessels. But for efficient moistening of the air, either a very large evaporating-surface or steam jets are required. The small open vessels or saucers on which some people rely, even when located in the air-passages of a hot-

air furnace, have only an infinitesimal influence. Vertical wicks of felt with their lower ends in water kept hot by the heating apparatus yield a rapid supply of moisture. Evaporation is greatly facilitated if the water or wicks are placed in the current of heated air entering the room. By a suitable construction the water may be replenished automatically. In very cold dry weather, the air-supply of an ordinary medium-sized house requires the addition of not less than 10 gallons of moisture every 24 hours, and sometimes much more.

Some authorities doubt any ill-effects from extreme dryness. The healthfulness of certain dry climates is pointed out, but in no climate is the air as dry as that of over-heated dwelling rooms. Medical observation of the ill-effects of such rooms should be accepted in default of exact experimental evidence which is still lacking.

Freshness

It is obvious that fresh, pure air is preferable to impure air. Air may be vitiated by poisonous gases, by dust and smoke, or by germs. Dust and smoke often go together.

Lighting by electricity is preferable to lighting by gas, as some of the gas is liable to escape and vitiate the air.

A very common and at the same time injurious form of air-vitiation is that from tobacco smoke. Smoking, especially in a closed space such as a smoking-room or smoking-car, vitiates the air very seriously, for smoker and non-smoker alike. Tobacco Smoke

As to dust, the morbidity and mortality rates in certain occupations, particularly those known as the dusty trades, are appreciably and even materially greater than in dustless trades. Dust

An accumulation of house-dust should be avoided. The dust should be removed—not by the old-fashioned feather duster which scatters the dust into the air, but by a damp or oiled cloth. Dust-catching furniture and hangings of plush, lace, etc., are not hygienic. A carpet-sweeper is more hygienic than a broom, and a vacuum cleaner is better than a carpet-sweeper. The removable rug is an improvement hygienically over the fixt carpet.

Bacteria in the air ride on the dust-particles. In a clean hospital ward, when air was agitated by ordinary dry broom-sweeping, the number of colonies of bacteria collected on a given exposure rose twentyfold, showing the effect of ordinary broom-sweeping. Bacteria

Sunlight

The air we breathe should be sunlit when possible. Many of our germ enemies do not long survive in sunlight.

Section II—Clothing

Air may be shut out not only by tight houses but also by tight clothes. It follows that the question of clothing is closely related to the question of ventilation. In fact, it is a reasonable inference from modern investigations that air-hygiene concerns the skin quite as much as the lungs. Therefore the hygiene of clothing assumes a new and hitherto unsuspected importance. A truly healthy skin is not the waxy white which is so common, but one which glows with color, just as do healthy cheeks exposed to the open air.

Porous Clothes

The hygiene of clothing includes ventilation, freedom from pressure, moderate warmth, and cleanliness. Loose, porous underclothes are already coming into vogue. But effective ventilation, namely such as will allow free access of air to the skin, requires that our outer clothes—including women's gowns and men's shirts, vests, vest-linings, and coat-linings—should also be loose and porous. Here is one of the most important but almost wholly neglected clothing reforms.

Most linings and many fabrics used in outer clothes are so tightly woven as to be impervious to air. Yet porous fabrics are always available, including porous alpacas for linings. To test a fabric it is only necessary to place it over the mouth and observe whether it is possible or easy to blow the breath through it. All bedding should be porous. Beds should be well aired after being used.

Air-baths

An air-bath promotes a healthy skin and aids it in the performance of its normal functions. Not every one can visit air-bath establishments or outdoor gymnasia or take the modern nude cure by which juvenile consumptives are sometimes treated; but any one can spend at least a little time in a state of nature on rising in the morning and upon retiring at night, when there are many things which are usually done while one's clothes are on which can be done just as well while they are off. Brushing the teeth, washing the hands, shaving, etc., necessarily consume some time during which the luxury of an air-bath can be enjoyed. Exercising in cold air, *if not too cold,* with clothing removed, is an excellent means of hardening the skin and promoting good digestion.

Tight Clothing

The constriction from rigid or tight corsets, belts (the latter in men as well as in women), tight neckwear, garters, etc., interferes with the normal functions of the organs which they cover. All such constriction should be carefully avoided. The tight hats generally worn by men check the circulation in the scalp. Tight shoes with extremely high heels deform the feet and interfere with their health. The barefoot cure is not always practicable, but any one can wear broad-toed shoes with a straight inner edge and do his part to help drive pointed toes out of fashion.* Such a reform should not be so difficult as to rid the women of China of their particular form of foot-binding. (See illustrations following this page.) Several anatomical types of shoes, that is, shoes made to fit the normal foot instead of to force the foot to fit them, are now available. In all except cold weather, low shoes are preferable to high shoes. High-heeled shoes are, of course, an abomination. When possible, sandals, now fortunately coming into fashion, are preferable to shoes, especially in early childhood (but the adult, whose leg-muscles and foot-structure are not often adapted to such footgear, must

Shoes

* See SUPPLEMENTARY NOTES on "Posture."

Fig. 1

Fig. 2

Fig. 3

Fig. 1 and 2.—Feet of Filipinos Who Have Never Worn Shoes

Note the normal line from the middle of the great toe through the ball of the foot to the center of the heel.

Fig. 3.—Foot of Filipino Who Has Worn Shoes for Several Months

Note the commencing deformity and the deviation from the normal of the line from the center of the great toe through the ball of the foot, and the enlargement of the great toe which leads to bunion joint.

be cautious in their use lest flat foot result).

The light weight of women's clothing as compared to men's is exhibited in supplementary notes, pages 258-259. Except for their absurd high-heeled and pointed shoes and slippers, women are much more sensibly drest in these days than men. It is regrettable that the soldier, otherwise so well cared for with regard to hygiene, must be encased in tight-fitting clothes and puttees which do not permit a proper circulation of air. The skin needs the stimulus of moving air properly to train it to change of temperature. A poorly trained skin is unduly sensitive to exposure or draft. A reform in military clothing may be the next great step in military hygiene.

Cottons, Linens, Woolens

Only the minimum amount of clothing that will secure warmth should be worn. Woolens protect most, but for that very reason they require the least exercise of the temperature-regulating apparatus of the body. While wool is also highly absorbent of moisture, it does not give off that moisture quickly enough. Hence, if worn next to the skin, it becomes saturated with perspiration, which it long retains to the disadvantage of the skin. Consequently, woolen clothing is best confined to outer garments, designed especially for cold weather. The under-

clothes should be made of some better con ducting and more quickly drying materia such as cotton or linen. In winter, ligh linen-mesh and medium wool over that, ca be worn by those who object to either line or wool alone.

Color

As to color, the more nearly white th clothes the better. This is especially true i summer, but there is believed to be som advantage in white at all seasons.

Those who have learned to clothe them selves properly find that they have grow far more independent of changing weathe conditions. They do not suffer greatly fro extreme summer heat nor extreme winte cold. Especially do they note that "raw" o damp cold days no longer tax their strength

Section III—Outdoor Living

Out-of-door Air

But we must not depend altogether on ven- tilating our houses and our clothes. We must turn our thoughts toward an outdoo life. The air of the best ventilated house is not as good as outdoor air. Those who spen much of their lives in the open enjoy the best health and the greatest longevity. I is a great advantage to go into camp i summer and to live in the country as muc as possible.

Climate, of itself, is a secondary consideration. Not every one can choose the best climate in the world, and, after all, the main advantages of fresh air can be enjoyed in almost any locality. Even in a city, outdoor air is, under ordinary circumstances, wonderfully invigorating.

Dampness The common prejudice against damp air greatly exaggerates its evils. While moderate dryness of air is advantageous, it seems nevertheless true that to live in damp, even foggy, air out-of-doors is, in general, more healthful than to live shut up indoors.

Outdoor Schools Observations have shown that the pupils in outdoor and open-window schools are not only kept more healthy but learn more quickly than those in the ordinary schools. It is even claimed that tuberculous children in an outdoor school may make more rapid progress in their studies than the more normal children in a badly ventilated school. Parents should insist on fresh air for their children when at school. They should also insist on outdoor playgrounds.

Outdoor Recreations For themselves, also, they should not neglect outings, picnics, and visits to parks. Whenever practicable, outdoor recreation should be chosen in preference to indoor recreation.

Occupations

Above all, outdoor occupations should when possible, be chosen in preference to indoor occupations, such as working on a farm rather than in a factory. It would help solve some of the greatest problems of civilization, if, in consequence of an increased liking for outdoor life, larger numbers of our population should join the "back-to-the-farm" movement. The close of the war is doubtless going to help this movement. Leaving the country for the city is often disastrous even for the purpose in view, namely, to gain wealth; for wealth gained at the expense of health always proves in the end a bitter joke. The victim proceeds through the rest of his life to spend wealth in pursuit of health.

Section IV—Outdoor Sleeping

Unfortunately most people can not live out-of-doors all of the time, and many are so situated that they can not even secure ventilation, granted that they want it. But there is one important part of the twenty-four hours when most people can completely control their own air supply. This is at night. We spend a third of our time in bed. Most of us live such confined lives during the day that we should all the more avail

ourselves of our opportunities to practise air hygiene at night.

It is the universal testimony of those who have slept out-of-doors that the best ventilated sleeping-room is far inferior in healthfulness to an outdoor sleeping-porch, open tent, or window tent (large enough to include the whole bed). For generations, outdoor sleeping has ocasionally been used as a health measure in certain favorable climates and seasons. But only in the last two decades has it been used in ordinary climates and all the year round. Dr. Millet, a Brockton physician, began some years ago to prescribe outdoor sleeping for some shoe-factory workmen who were suffering from tuberculosis. As a consequence, in spite of their insanitary working-places (where they still continued to work while being treated for tuberculosis), they often conquered the disease in a few months. It was largely this experience which led to the general adoption, irrespective of climate, of outdoor sleeping for the treatment of tuberculosis. The practise has since been introduced for nervous troubles and for other diseases, including pneumonia. Latterly the value of outdoor sleeping for *well* persons of all

Tuberculosis

Well Persons

classes, infants and children as well a adults, has come to be widely recognized.

Vital Resistance

Outdoor sleeping increases the power t resist disease, and greatly promotes physica vigor, endurance, and working power.

Night Air

Many people are still deterred from sleep ing out by a mistaken fear of night air an of the malaria which they imagine thi dreaded night air may bring. To-day w know that malaria is communicated by th bite of the anopheles mosquito and never b the air. The moral of this is not to shut ou the night air, but, when necessary, to shu out the mosquito by screens. The experi ment has been made of sleeping out-of-door *in screened cages* in the most malarial o places and no malarial infection resulted tho those who were unprotected and wer consequently bitten by mosquitoes contracte malaria as usual. The truth is that night air, especially in cities, is distinctly pure than day air, on account of the fact tha there is much less traffic at night to stir u dust.

Protection From Cold

It is very important that any sleeping balcony, tent or shack should be protected from the wind on two or—in very windy places—three sides. But of course sleeping out-of-doors does not reach its maximum efficiency

if there is too much protection, that is, if the sleeping-out place is so shut in that very free currents of air are not secured. An outdoor porch really ceases to be an outdoor porch and becomes really an indoor room when enclosed on four sides. A roll curtain (preferably rolling from the bottom) can be arranged on the open side or sides, to be used in case of storms only.

In cold weather a thick mattress, or two mattresses, should be used. It is not only what is over the sleeper, but also what is under him, that keeps him warm. The body should be warmly clad, and the head and neck protected by a warm cap or helmet or hood. To prevent the entrance of cold air under the bed-clothes, one or more blankets should be extended at least two feet beyond the head, with a central slit for the head. Early awakening by the light may, if necessary, be prevented by touching the eyelids with burnt cork, or by bandaging the eyes with a black cloth or stocking. Sheets should be well warmed in the winter-time before being used. They can easily be warmed with a hot-water bag, flatiron, or soapstone. Blankets next to the skin are not hygienic.

Sleeping out is really much easier than most people imagine. In fact, few, if any, of

Sleeping-tents

the other cardinal rules of hygiene are so easy to obey. Where a sleeping-porch is not available, an inward window tent can always be had which puts the sleeper practically out-of-doors and at the same time cuts off his tent from the rest of the room.

Outdoor Tents

An outdoor tent must be kept well opened. Otherwise it fails of its purpose. The common opinion that a tent is ventilated through the "meshes" of the canvas is erroneous. Canvas is a tightly woven fabric and impervious to air. That is why it makes good sails. One of the most modern boys' camps has given up the use of tents altogether, employing instead open wooden "shacks," because of the difficulty of keeping the tents sufficiently open, especially in rainy weather.*

During the mobilization of our national army in the winter of 1917, the epidemics of measles and pneumonia were in great part ascribed to the over-crowding of tents. The recommendations of the Surgeon-General on this matter were for a time not followed until sad experience demonstrated the wisdom of his advice. It was also found that there was a high sickness rate from these maladies among the men from the rural districts,

* Complete directions for convenient out-of-door sleeping will be furnished upon application, by the Life Extension Institute.

which was ascribed to the fact that among such troops there were many who were not immune to measles and crowd-diseases. The greater prevalence of measles among the children in crowded cities weeds out the non-resistant by death and renders the survivors immune.

Section V—Deep Breathing

Ordinarily, breathing should be unconscious, but, every day, deep-breathing exercises should be employed. "A hundred deep breaths a day" is one physician's recipe for avoiding tuberculosis. A Russian author, who suffered a nervous breakdown, found—after trying many other aids to health without success—that a retired life for several months in the mountains in which simple deep-breathing exercises practised systematically every day formed the central theme, effected a permanent cure. Deep breathing is a great resource for people who are shut in most of the day. If they will seize the chance, whenever it offers, to step out-of-doors and take a dozen deep breaths, they can partly compensate for the evils of in-door living.

In ordinary breathing only about 10 per cent. of the lung contents is changed at each

breath. In deep breathing a much larger percentage is changed, the whole lung is forced into action, and the circulation of the blood in the abdomen is more efficiently maintained, thus equalizing the circulation throughout the body. The blood-pressure is also favorably influenced, especially where increased pressure is due to nervous or emotional causes.

Breathing Exercises

Breathing exercises should be deep, slow, rhythmic, and through the nose, not through the mouth. A certain Oriental deep-breathing exercise is particularly valuable to insure slowness and evenness of the breath. It consists of pressing a finger on the side of the nose, so as to close one nostril, breathing in through the other nostril, breathing out of the first nostril in the same manner and then reversing the process. Attention to the slight sound of the air, as it passes through one open nostril enables the breather to know whether the breathing is regular or is slightly irregular. Such breathing exercises can be taken at the rate of three breaths per minute, and the rate gradually reduced until it is only two or even less per minute.

Muscular Exercise

Muscular exercises stimulate deep breathing, and, in general, the two should go to-

gether. But deep breathing by itself is also beneficial, if very slow. Forced *rapid* breathing, on the other hand, is comparatively valueless, and indeed may be positively harmful. Oxygen is absorbed only according to the demand for it in the body and not according to the supply.

Singing

Singing requires deep breathing, and is for that and other reasons an excellent hygienic practise.

Mental State

The mode of our breathing is closely related to our mental condition; either influences the other. Agitation makes us catch our breath, and sadness makes us sigh. Conversely, slow even breathing calms mental agitation. It is not without reason that, in the East, breathing exercises are used as a means of cultivating mental poise and as an aid to religious life.

CHAPTER II

FOOD

Section I—Quantity of Food

THE body has often been compared to a blacksmith's forge, the lungs being the bellows and food the coal. The comparison is a good one, for food is actually burned in the body by the aid of the air we breathe.

Calories

Most food is capable of being used as body-fuel and by far the greater part of it is so used. Consequently, food is measured in fuel-units, called calories. Many people eat too much, that is, too many calories; some eat too little, that is, too few calories. In both cases the person is usually unaware of the fact because he makes the mistake of measuring his food by weight or bulk. Some foods are concentrated, that is, contain many calories of food value in a given bulk; others are bulky, that is, contain few calories in a given bulk. For instance, olive oil is concentrated, and most vegetables are bulky. A third of an ounce of olive oil contains 100 calories, which is as much as is

contained in a pound or more of tomatoes, lettuce, celery, cucumbers, string beans, asparagus, or watermelon.

It will help to give a picture of food values if, before going further, we note how much it takes of some of the common foods to make a given amount of food value, say 100 calories. It is surprizing in how many cases the ordinary amount of food served at table happens to contain about 100 calories. We find 100 calories in a small lamb chop (weighing about an ounce); in a large egg (about 2 ounces); in a small side-dish of baked beans (about 3 ounces); in 1½ cubic inches of cheese (about an ounce); in an ordinary side-dish of sweet corn (about 3½ ounces); in one large-sized potato (if baked, about 3 ounces; if boiled, about 4 ounces); in an ordinary thick slice of bread (about 1½ ounces); in one shredded wheat biscuit (about an ounce); in a very large dish of oatmeal (about 6 ounces); in a small piece of sponge-cake (about an ounce); in a third of an ordinary piece of pie (about 1½ ounces); in three teaspoonfuls or 1½ lumps of sugar (about 1 ounce); in a dozen peanuts (about ⅔ of an ounce); in eight pecans (about ½ an ounce); in four prunes (about 1 ounce); in two apples (about 7 ounces);

in a large banana (about 4 ounces); in half a cantaloup (about 9 ounces); in seven olives (about 1½ ounces); in a very large orange (about 10 ounces); in an ordinary pat of butter (about ½ an ounce); in a quarter of a glass of cream (about 2 ounces); in a small glass of milk (about 5 ounces).*

The ordinary sedentary man needs about 2,500 calories per day. But the larger the person (provided the bulk is due to muscle and active tissue and not to fat) or the more muscular the work he does, the more food he needs. That is, the number and activity of the cells forming the organs and muscles and blood affect the food requirement.

Favorable Weight

Life insurance experience has clearly shown that weight, especially in relation to age, is an important factor in influencing longevity. Except in the earlier ages of life, overweight (reckoned relatively to the average for that age) is a more unfavorable condition, in its influence on longevity, than underweight.

The question of whether an individual is really underweight or overweight can not be determined solely by the life insurance

* See SUPPLEMENTARY NOTES for "Table of Food Values."

tables.* Some types who are of average weight according to the tables, may be either underweight or overweight when considered with regard to their framework and general physical structure. Nevertheless, it should be remembered that, notwithstanding the effort of life insurance companies to select carefully the favorable types of overweight and underweight, the mortality experience on youthful underweights has been unfavorable, and the mortality experience on middle aged and elderly overweights has been decidedly unfavorable. The lowest mortality is found among those who average, as a group, a few pounds over the average weight before age 35, and a few pounds under the average weight after age 35. That is, after the age of 35, overweight is associated with an increasingly high death-rate, and at middle life it becomes a real menace to health, either by reason of its mere presence as a physical handicap or because of the faulty living habits that are often responsible for its development.

After the age of 35 is reached, 15 to 20 pounds over the average weight should prompt one to take careful measures for reducing weight. Habits should be formed

* See SUPPLEMENTARY NOTES, "Influence of Build on Longevity."

that will keep the weight down auto matically, instead of relying upon inter mittent attempts that are more than likel to fail. No matter how well one feels, on should take steps to keep out of the clas that life insurance companies have found t be undesirable as risks.

Overweight

If there is a family tendency to over weight, one should begin early to form habit that will check this tendency. If consider able overweight is already present, cautio is necessary in bringing about a reductio Barring actual disease, this can usually b done without drugs if the person will b persevering and faithful to a certain *régime*

Constant vigilance is necessary, yet it i worth while when one considers the incon venience as well as the menace of obesity.

Accessories

One reason why many people eat grea quantities of food without realizing it, is th common delusion that many articles such a candy, fruits, nuts, peanuts, popcorn, ofte eaten between meals, "do not count." An other common mistake is to overlook acces sories, such as butter and cream, which ma contain more actual food value than all th rest of a meal put together. Ice-cream an other desserts also have more food valu than is usually realized. Nature count

* See SUPPLEMENTARY NOTES on "Food."

every calory very carefully. If the number of calories taken in exceeds the number used by the body (or excreted unused), the excess accumulates in fat or tissue. Thus, if some 3,000 calories are taken in each day and the calories used up or excreted are only 2,800, then 200 must be retained and accumulated in the body.

Underweight

A person who is not heavy enough can usually gain weight by following the general rules of hygiene, especially in the matter of increasing the fuel or energy foods. But he should not force himself to eat beyond his natural capacity to digest and assimilate the food, while overfatigue and exhausting physical exertion should be carefully avoided.

Diet in Middle Life

As age advances, the consumption of meat and all flesh foods should be decreased and that of fruit and vegetables, especially those of bulky character and low food value, such as lettuce, tomatoes, carrots, turnips, salsify, oyster-plant, watercress, celery, parsnip, should be increased.

Diet in Hot Weather

Generally the quantity of food should be slightly decreased in hot weather, when fewer calories are needed to sustain the heat of the body. In particular, less meat and eggs should be eaten in the summer, on ac-

count of the special tendency of meats an like foods to produce immediate heat.

Each individual must decide for himsel what is the right amount of food to eat. I general, that amount is right which wi maintain the most favorable condition o weight. If the weight, endurance, and gen eral feeling of well-being are maintained, on may assume that sufficient food is taken.

Brainwork and Eating

It is physical, not mental work, which use up the greater part of our food. The com mon impression that brain-work or expendi ture of mental energy creates a special nee for food is erroneous. The sedentary brain worker often gains weight without eatin very much. What he really needs is exer cise to use up the food, but if he will no take exercise, then he should reduce his foo even below the small amount on which h gains weight.

Eating When Fatigued

Which meal in the day should be heav and which light depends largely on one' daily program of work, the aim being t avoid heavy meals just before heavy work When very tired it is sometimes advisabl to skip a meal or to eat only lightly, as o fruits and salads, and avoiding rich or con centrated foods like fats and sweets. A ma who eats heartily when he is very tired i

likely to be troubled afterward with indigestion.*

Section II—Protein Foods

Protein, Fat, and Carbohydrate

In the last section it was stated that food is fuel. But there is one constituent of food which, while it *can* be used as fuel, is especially fitted for an entirely different purpose—to build tissue, that is, to serve for the growth and repair of the body. This tissue-building constituent in food is called protein. The two other chief constituents in food are fat and carbohydrate, the last term embracing what are familiarly known as starch and sugar. Fats and carbohydrates are only for fuel and contain carbon as the essential element. Protein contains nitrogen as the essential element in tissue-building. The white of egg and the lean of meat afford the most familiar examples of protein. They consist entirely of protein and water. But meat and eggs are not the only foods high in protein. In fact, most ordinary foods contain more or less protein. The chief exceptions are butter, oleomargarine, oil, lard, and cream—which consist of fat (and water)—and sugar, sirups, and starch, which consist of carbohydrate (and water).

* See SUPPLEMENTARY NOTES for specific directions regarding diet for underweight and overweight.

Proportion of Protein

Foods should be so selected as to give to the ration the right amount of protein, or repair-foods, on the one hand, and of fats and carbohydrates, or fuel-foods, on the other. A certain amount of protein is absolutely essential. While, for a few days, protein may be reduced to little or nothing without harm, yet if the body be long deprived of the needed protein it will waste away and ultimately death will result. Therefore, too little protein would be a worse mistake than too much.

The right proportion of protein has been the subject of much controversy. According to what are regarded as the best investigations, it is generally about 10 per cent. of the total number of heat-units consumed. This does not, of course, mean 10 per cent. of the total weight nor 10 per cent. of the total bulk, but 10 per cent. of the total nutriment, that is, 10 calories of protein out of every 100 calories of food.

Human Milk

That 10 calories out of 100 is not too small an allowance is evidenced by the analysis of human milk. The growing infant needs the maximum proportion of protein. In the dietary of the domestic animals, the infant's food, the mother's milk, is richer in protein than the food of the grown ani-

mal. Consequently an analysis of human mother's milk affords a clue to the maximum protein suitable for human beings. Of this milk only 7 calories out of every 100 calories are protein. If all protein were as thoroughly utilized as milk-protein or meat-protein, 7 calories out of 100 would be ample, but all vegetable proteins are not so completely available. Making proper allowance for this fact, we reach the conclusion that 10 calories out of every 100 are sufficient.

Excessive Use of High-Protein Foods

A chief and common error of diet consists, then, in using too much protein. Instead of 10 calories out of every 100, many people in America use something like 20 to 30, more than double what is known to be ample. This excessive proportion of protein is usually due to the extensive use of meat and eggs, altho precisely the same dietetic error is sometimes committed by the excessive use of other high-protein foods such as fish, shell-fish, fowl, cheese, peas, and beans, or even, in exceptional cases, by the use of foods less high in protein when not offset by any foods very low in protein. The idea of reducing the protein in our diet is still new to most people.

Professor Rubner of Berlin, one of the world's foremost students of hygiene, said,

in a paper on "The Nutrition of the Peo-ple," read before the International Congress on Hygiene and Demography:

Injuries From Over-abundance of Protein

"It is a fact that the diet of the well-to-do is not in itself physiologically justified; it is not even healthful. For, on account of false notions of the strengthening effect of meat, too much meat is used by young and old, and by children, and this is harmful. But this meat is publicly sanctioned; it is found in all hotels; it has become international and has supplanted, almost everywhere, the characteristic local culinary art. It has also been adopted in countries where the European culinary art was unknown. Long ago the medical profession started an opposition to the exaggerated meat diet, long before the vegetarian propaganda was started. It was maintained that flour foods, vegetables, and fruits should be eaten in place of the overlarge quantities of meat."

The protein requirement, so long the subject of scientific controversy based largely upon a misinterpretation of Voit's views which were never dogmatically in favor of high protein, but merely reflected a statistical study of observed consumption and not of ascertained requirements, has ceased to be a vexed question since the German war experience has become available. Even those most firmly convinced that the so-called Voit Standard of 118 to 145 grams of protein daily for the average individual

was a requirement of safety are now willing to concede that what Voit himself practically exprest is true, namely, that good health and physical efficiency can be maintained on 60 to 75 grams of protein. It is not generally known that Voit conceded that a vegetarian can maintain nitrogen equilibrium on 48.5 grams of protein daily, and that an active working man can subsist on less than his supposed minimum of 118 grams.

The type of protein and whether or not it is suitable for growth as well as maintenance is now considered the important protein problem. Protein is not as simple a substance as formerly supposed. It can be split into eighteen different amino-acids, one of which, tryptophan, is necessary to life, and another, lysin, is necessary for growth.

If proteins that do not contain the necessary amino-acids are relied upon for nutrition, they fail either to promote growth or to maintain the body tissues. An unsuitable protein for maintenance, for example, is zein, which after it is split into its component amino-acids can not be reconstructed into all the necessary tissues. Such a protein must be supplemented by other types of protein such as are found in milk or eggs.

The amino-acids of a protein might be compared to the letters in a paragraph which may be "pied" or mixed and again placed together to reconstruct the same sentence, but not one of the same general tenor requiring a few additional letters. By supplying the missing letters the paragraph can be completed. Fortunately in a fairly prosperous mixed diet the various types of protein containing the necessary amino-acids are found. Some diets, however, such as degerminated corn meal, molasses and pork fat would be inadequate as to both amino-acids and vitamins.

At a recent meeting of the Interallied Council of Physiologists it was decided that meat was not a physiological necessity. The following statement was made: "It is not thought desirable to fix a minimum meat ration, in view of the fact that no absolute physiological need exists for meat, since the proteins of meat can be replaced by other proteins of animal origin, such as those contained in milk, cheese and eggs, as well as by proteins of vegetable origin."

When protein is taken in great excess of the body's needs, as is usually the case in the diet of Americans, added work is given the liver and kidneys, the circulation is over-

timulated, and the "factor of safety" of hese organs may be exceeded.

The United States soldier is still fed on a ery high protein and meat ration, contrary o the views of the Surgeon-General's office nd of leading physiologists. There is no roof that meat increases muscular strength nd endurance, and there is much experiiental evidence to the contrary; only the diffiulty of adopting such a regulation during the tress of war interfered with the complete pplication of this scientific knowledge to the eeding of the soldier. It is gratifying to ote, however, that cooperation between the uartermaster-General's Department and the urgeon-General's Office seems to have been stablished, and the soldier's ration is receivng close study and has already been mateially modified.

Francis G. Benedict, in his experiments at he Nutrition Laboratory of the Carnegie nstitution, demonstrated that physical enurance and good health could be maintained n a very low food allowance, about twohirds of that previously considered necesary. He has uttered the caution, however, hat altho a protein intake even less than that alled for in the so-called Chittenden diet is ufficient to maintain health and activity, an

undue reduction of the nitrogen reserve in the body by a diet not only low in protein but low in calories may bring about a lack of "pep" or energy. If the diet is sufficient to maintain weight there will be no undue nitrogen loss on the so-called low protein diet of 60 to 75 grams daily for the average individual. From this we may reason that inasmuch as protein is more stimulating than other food, as shown by the fact that it increases cellular activity, heat production and the rate of metabolism as well as the heart rate, the addition of protein beyond the point necessary to maintain normal activity is likely to result in organic strain.

It is a fact that an equal amount of protein will increase the heart rate and the rate of metabolism or chemical exchange in the tissues more than carbohydrates and much more than fats.

There is no experimental evidence to show that a low protein diet, *per se,* that is, low only in protein and not low in calories, will unfavorably affect the energy or normal "pep" of the organism. "Pep" beyond the normal may well be regarded as intoxication and something for which in the long run a physiological price must be paid.

Flesh foods—fish, shell-fish, meat, fowl—
vhen used in great abundance, are subject
o additional objections. They tend to pro-
luce an excess of acids, are very prone to
utrefaction, and contain "purins" which
ead to the production of uric acid. This is
specially true of sweetbreads, liver and
idney. The well-known deficiency in lime
f flesh foods often needs to be taken into
onsideration in the dietary. Some of the
egetable foods, rich in protein, such as peas
nd beans, are likewise not free from objec-
ion. Their protein is not as completely avail-
ble as milk or meat protein, and is therefore,
ikewise liable to putrefaction. Unlike most
egetable foods, they contain some purins.
These foods are, however, rich in iron, which
enders them a more valuable source of pro-
ein for children and anemic people than
neat provided milk is also taken. Also,
n excess of protein is not so likely to be
lerived from such bulky foods as from meat,
vhich is a concentrated form of protein. A
elatively cheap and satisfactory source of
rotein in very available form is skimmed
nilk and cottage cheese.

Animal Proteins

We have spoken thus far only of the
eeded proportion of protein. The re-
nainder of the diet, say 90 per cent. of the

calories, may be divided according to pe sonal preference between fats and carb hydrates in almost any proportion, pr vided some amount of each is used. A goo proportion is 30 per cent. fat and 60 p cent. carbohydrate.

As already stated, all protein is not com pletely available for growth as well a maintenance. Protein is not a simple, hom geneous substance. Complete proteins co tain eighteen different amino-acids, one which, lysin, is necessary for growth, and th other, tryptophan, is necessary to life. A pr tein deficient in either of these substance must be supplemented by other more complet proteins. The average dietary usually co tains proteins fulfilling these requirements.

Section III—Hard, Bulky, and Uncooked Food

The wise choice of foods does not consis entirely in balancing the ration as to pr tein, fat, and carbohydrate.

Hard Foods

Hard foods, that is, foods that resist th pressure of the teeth, like crusts, toast, har biscuits or crackers, hard fruits, fibrou vegetables and nuts, are an extremely im portant feature of a hygienic diet. Har foods require chewing. This exercises th jaws and improves the condition of toot

ckets and teeth, and insures the flow of liva and gastric juice. If the food is not ly hard, but also dry, it still further in- tes the flow of saliva. Stale and crusty ead is preferable to soft, fresh bread and lls on which so many people insist. The orots of the Philippines have perfect eth so long as they live on hard, coarse ods. But civilization ruins their teeth nen they change to our soft foods.

Bulk *Versus* Concentrated Foods

Most of the ordinary foods lack bulk; ey are too concentrated. For this purpose is found that we need daily, at the very ast, an ounce of cellulose, or "woody er." This is contained in largest measure fibrous fruits and vegetables—lettuce, lery, spinach, asparagus, cabbage, cauli- wer, corn, beets, onions, parsnips, squash, impkins, tomatoes, cucumbers, berries, etc.

Until recently would-be food reformers ive made the mistake of seeking to secure ncentrated dietaries, especially for army tions. It was this tendency that caused ipling to say, "comprest vegetables and eat biscuits may be nourishing, but what ommy Atkins needs is bulk in his inside."

One of the most serious faults in the cus- mary diet to-day, a fault especially great

among the masses, is the lack of cellulose c roughage.

Too much of the dietary consists of food without cellulose such as meat, milk, egg butter, cheese, sugar, and white bread. Th addition of fruit and vegetables to such a di is very important from the standpoint of in testinal conditions.

Raw Foods

Cooking is an important art; but som foods when cooked lose certain small con ponents or protective substances called vita mins, which are also found in the skin c coating of grains, especially rice, also i yolk of egg, raw milk, fresh fruit, and fres vegetables, especially peas, beans and toma toes. These vitamins are very important t the well-being of the body. Their absence i certainly responsible for the disease beriber and possibly pellagra and scurvy, as well a much ill health of a less definite sort. Som

Vitamins

raw or uncooked foods, therefore, such a lettuce or tomatoes, celery, fruits, nuts, an milk, should be used in order to suppl these minute and as yet not well-understoo substances, some of which are apparently de stroyed by the prolonged cooking at the ten perature which is employed in order t sterilize canned foods or to dry vegetable They are also diminished and often de

troyed by ordinary cooking, except in acid ruits and acid vegetables.

Raw Milk

It is true that only very clean milk is enirely safe in an absolutely raw state, and hat heat is usually needed to kill the germs. But this heat, even at the comparatively low emperature of pasteurization, is thought by ome to destroy the vitamins that prevent curvy. Orange juice or canned tomatoes hould always be given to infants over one month old who are fed pasteurized milk.

The subject of these protective food subtances (vitamins) is still a matter of scienific debate and is by no means completely olved. A good principle to remember is hat laid down by McCollum, that where the rains and cereals form a large part of the iet liberal amounts of milk are necessary to nake the diet adequate. In some measure a iberal quantity of green leaves of plants will ake the place of milk. But this can not be ooked upon as a complete substitute for milk.

Authorities are agreed as to the existence f at least two types of vitamins, both of which are soluble in water, but only one of which is soluble in fats. That another vitamin xists in raw milk and in orange juice and ther anti-scorbutic foods is the belief of competent investigators, although a multiplicity

of vitamins is not regarded as probabl
The fact that complete withdrawal of foo
does not produce the symptoms chara
teristic of the so-called deficiency disease
raises the question as to whether the
vitamins may not act as "catalyzers"
substances that prevent the formation
poisonous material in the tissues when foo
is eaten. The further fact that the admini
tration of food substances supposed to co
tain these vitamins, such as orange juice
potatoes, will in man very quickly relie
a condition such as scurvy, tends to confir
this view, as prolonged depletion of th
tissues could hardly be made good in such
brief interval.

McCollum, Goldberger, and others hav
pointed out that conditions such as pellag
may be due to improper diet and yet n
wholly to a deficiency in a specific vitami
The weight of evidence, however, still favo
the view that in scurvy a specific vitamin
lacking, differing from either the fat solub
A or water soluble B vitamin. There can b
no question as to the need for safeguardin
infants fed on pasteurized or boiled milk b
including orange juice or canned tomatoes i
the diet after the first month.

This whole subject is now being give

itical attention by physiologists and new ght is being continually thrown on these oblems, yet they still are shrouded in much ystery. In the meantime it is a simple mat- r to protect against scurvy by the means iggested.

For some years the "Rules of Hygiene" age 138) have contained this caution as the need for raw foods in the dietary.

Not all foods can be taken raw with ad- intage. Most starchy foods, such as cereals id potatoes and unripe fruit must, of urse, be cooked in order to be made fit to it.

Raw foods have dangers of their own in rrying germs and parasites, and it is ex- emely advisable that all raw foods should very thoroughly washed before eating.

Acids and Inorganic Salts

In addition to protein, fat, carbohydrate, id vitamins, there are other elements which e body requires to maintain chemical uilibrium, and for the proper maintenance organic functions. These are the fruit id vegetable acids and inorganic salts, pecially lime, phosphorus, and iron. These ibstances are usually supplied, in ample nounts, in a mixed diet, containing a iriety of fruits and vegetables and an ade- iate amount of milk and cream. Potatoes,

needlessly feared by some in acid conditior (such as gout), are actually valuable be- cause of their alkalinity.

This acid balance of the diet is a subjec much neglected. Chemically foods may be acid-forming, base-forming, or neutral Most acid fruits are base-forming. Th tendency of modern dietaries has been, a least until recently, toward acidity, tha is, eggs, cereals, and meats, which ar acid-forming, and milk, fat, and sugar whicl are practically neutral preponderate in th average dietary. Fruits and green vege tables which are chiefly base-forming ar required in generous amounts to neutraliz the acid-forming trend of meat and eggs.

With regard to what might be termed th complexities of human dietetic requirement Professor McCollum has well summarize this matter as follows:

"The studies of the past decade have re vealed the fact that the adequate diet c the higher animals must contain protein c the type known as 'complete,' by which w mean a protein yielding all the amino-acid that are required in the nutrition of an an mal. It must contain in the form of suitabl salts, at least some of the inorganic el ments, namely, calcium, magnesium, sodiur

ɔotassium, iron, chlorin, iodin, phosphorus, ınd sulphur. The sulphur must be in ɔrganic combination in the form of the ımino-acid cystin. The diet must supply a suitable quota of energy in the form of pro-ein, carbohydrates and fats, and must in ıddition contain certain substances of un-known chemical nature to which Funk gave he name 'vitamins.' There are still differ-ences of opinion concerning the probable ıumber of these substances."

Section IV—Thorough Mastication

Whether it be from lack of hard foods, re-quiring prolonged chewing, or from the ıervous hurry of modern life, or from other auses, it is undoubtedly a fact that most people in America eat too rapidly. The correction of this habit will go far toward reforming an individual's diet in every way.

Thorough mastication means masticating ıp to the point of involuntary swallowing. It does not mean forcibly holding the food n the mouth, counting the chews, or other-wise making a bore of eating. It merely neans giving up the habit of forcing food lown, and applies to all foods, even to iquid foods, which should be sipped.

Evils of Insufficient Mastication

The consequences and evils of insufficie
mastication are many, and may be enume
ated as follows: Insufficient use of the tee
and jaws (and hence dental decay as well
other and worse dental evils); insufficie
saliva mixed with the food (and hence i
perfect digestion of the starchy substances
insufficient subdivision of food by mastic
tion (and hence slow digestion); the failu
of the taste nerves to telegraph ahead, as
were, to the stomach and other digesti
organs an intimation of the kind and amou
of digestive juices required (and hence i
digestion); the overseasoning of food
make it relishable even when bolted (a
hence overeating and irritation of the muco
lining); the excessive use of meat and eg
and like foods, which can be eaten rapid
with relative impunity, and the correspon
ing neglect of other foods which require mo
mastication, like bread, grains, vegetable
and salads (and hence intestinal poisoning

The habit of insufficient mastication
subtle, because it has become "secon
nature" with most of us. To free ourselv
of it we must first of all allow plenty

Prolonged Relish of Food

time for our meals and rid our minds of t
thought of hurry. A boy's school in whic
the principal is endeavoring to fight t

ıbit of food-bolting has wisely ordained .at no boy may leave the dining-room until certain hour, even if he has finished eating ng before. In this way the boy soon learns ıat there is nothing to be gained by fast ıting, and, in fact, that the pleasantest way ' spending the meal-time is to prolong the ·lish of the food. It would be well if all of ; would adopt a similar rule for ourselves. r. Gladstone did something of the sort and as noted for the slow mastication of his ›od. Latterly Mr. Horace Fletcher set ıch a rule for himself, and revived the in- rest of the public in the subject.

At first one must give some conscious at- ntion to his efforts to reform; but if one ill merely attend carefully to the first three outhfuls of a meal, the slow pace can often ≥ established for the rest of the meal with- ıt further thought. The First Three Mouthfuls

Slow eating is important not merely as a atter of mastication, but also as a matter ᶠ tasting and enjoyment. Food must have pleasing taste and flavor and then must ə enjoyed in order to be most readily as- milated. Careful Tasting

There is a mistaken notion that the hygiene f food means "giving up all the things that ıste good." While it is true that, in many Increased Enjoyment

cases, sacrifices have to be made, the net re
sult of reforming one's diet is not to dimin
ish but to increase the enjoyment of foo
In general, it is extremely unhygienic to ea
foods which are not relished. Experiment
by Pavlov and others have shown that th
tasting and enjoyment of food stimulate th
flow of digestive juices.

Choosing Foods

Finally, slow eating is a great aid in th
proper choice of foods. Some suggestion
have already been given as to the wise choic
of foods, but no rules can be formulate
which will completely insure such a choic
Even the wisest physiologist can not depen
altogether on his knowledge of food value
while, to the layman, the problem is so com
plicated that his main reliance must be o
his own instincts. Animals depend ex
clusively on instinct except when unde
domestication. Civilized man should no
and can not altogether depend upon instinc
but his food instincts are far more keen an
correct if he obeys the rule of eating slowl
than if he bolts his food.

"Good" and "Bad" Foods

In the choice of foods it is as difficult t
distinguish absolutely between what a
"good" and "bad" foods as it is to classif
human beings into "good" and "bad." A
we can say is that some foods are bette

than others, remembering that it is usually more important to be *satisfied,* even if the foods are not "ideal," than to be unsatisfied with what in the abstract seem "ideal" foods.

Among the best foods for most people are fruits, potatoes, nuts (if well masticated), milk, sour milk, and vegetables. Among the worst foods are putrefactive cheeses, sweetbreads, liver, kidneys, "high" game or poultry.

But a fastidious study of foods will find some faults as well as some virtues in almost any food. The best way to help the ordinary man choose his foods is to advise him to use as much as possible of the "better" and as little as possible of the "worse" without attempting to draw a hard and fast line between the "good" and "bad."

Salt, Pepper Spices

Salt, pepper, and hot condiments should be used very sparingly, if at all.

Sugar and Candy

A great cause of ill health is overuse of sugar in concentrated form, candy, etc., especially by the sedentary. Sugar has a high food value and is readily utilized for combustion. If taken between meals it is likely to increase the calories greatly and thus may lead to *overnourishment.*

Water a Food

Take a sufficient amount of water dail
Water, commonly looked upon as a mer
diluent of food, or unfortunately too ofte
as a means of washing it down, is physio
logically a true food, a regulating foo
Some foods consist very largely of cellulos
and water. Water keeps the body in flui
equilibrium, is necessary to carry on th
chemical exchanges in the tissues and to ac
as a vehicle in carrying off the wast
products of the body. It also enters into th
constitution of the body and forms the bul
of the blood and approximately two-third
of the body weight. One can go far longe
without other types of food, but withou
water or watery foods death will occu
within a few days. One of the most im
portant rules of hygiene, therefore, is tha
requiring an adequate daily intake of wate
While the requirement varies to some ex
tent with the type of individual, the bod
weight and the season of the year, it ma
be said that about six glasses daily in addi
tion to that secured in diet will cover aver
age needs. This could hardly be an exces
for any individual except an invalid wit
severe stomach, heart or kidney troubl
and would doubtless be sufficient for an
individual not requiring special eliminatio

measures, or replacement of losses due to excessive perspiration.

Water with Meals

There is, for normal people, no objection to drinking a moderate amount of water at meals—say one or two glassfuls—provided it is not taken when food is in the mouth and used for washing it down.

People who drink very freely of milk or other fluid, do not, of course, need so much water.

Milk should not be taken between meals merely to quench thirst. It is a highly nutritive food and may induce overweight if so taken. Light-weight and under-nourished people can, of course, advantageously supplement the nutrition at meals by using milk as a beverage between meals.

One of the most important functions of water, waste removal, is treated in the chapter on Poisons, to which the reader is referred for more complete information on this subject.

The Digestibility of So-called "Indigestible" Foods

The science of dietetics will develop rapidly in the future, and in a few years it will probably be possible to be more definite than we have been here. At present there is much unknown, especially as to how far our rules have to be modified for the particular individual. Personal idiosyncrasies have to be

taken into account. Sometimes "What i one man's meat is another man's poison." On the other hand, many have mistake ideas as to their own idiosyncrasies. Fo instance, many people think that nuts neve agree with them, when the trouble really i that they do not masticate them properly Many think peanuts indigestible, not realiz ing either the importance of mastication o the importance of avoiding over-roasting The ordinary peanuts are over-roasted Peanuts very slightly roasted and very thoroughly masticated seldom disagree Others believe that bananas never agree with them, when the fact is that they eat them too green. The banana vender usually finds that the ignorant public buys his fruit best when its color is an even yellow, and he puts aside for himself the only bananas ripe and fit to eat, namely, those which are mottled with black.

Avoidance of Fads

Each individual must use his own intelligence and common sense, avoiding so far as he can the mistake of following a "fad" and accepting a theory without sufficient evidence; and the opposite mistake of accepting as hygienic the customs about him simply because they are customs, and thus mistaking for fads any conclusions of science

which are discordant with current custom.

A number of investigators, including Raymond Pearl, have called attention to the importance of variety in diet. It appears to be a fact that a monotonous and flavorless diet even tho adequate in nutritive substances and in calories, may fail because lack of appetite will result in an inadequate consumption of food and lowered nutrition. The importance of thorough mastication in order to extract the full flavor of food should be borne in mind in this connection.

Food that can not excite the taste organs when rapidly passing over, may have flavor and relish if thoroughly chewed and tasted. There is, however, much popular misconception as to food absorption. Food that actually reaches the stomach will, in the absence of some special type of disease, be digested and absorbed.

Necessity of Medical Examination

It is a good idea to consult a physician in regard to one's diet, and endeavor intelligently to follow his advice and not insist on one's own diet, selected from the standpoint of mere self-indulgence or custom. Moreover, since many, without being aware of the fact, are affected with Bright's disease, diabetes, etc., in their early stages, in which dietetic precautions are especially

necessary, it is well, even for those who are apparently in good health, to be medically examined as a preliminary to a re-arrangement of their diet along the best lines.

CHAPTER III

POISONS

Section I—Elimination

The life processes produce poisons as by-products. Were it not for the liver, which destroys many poisons, and the kidneys, bowels and skin, which eliminate poisons, we would speedily die. In fact, as it is, we almost always do die of poisons! The only real exception is when we are killed by physical violence. When germs kill us it is chiefly by the poisons which they generate. Poison, therefore, is the main factor in causing old age and death not directly due to injury.

It will be seen, therefore, how extremely important it is to reduce our daily dose of poisons and to eliminate as thoroughly and promptly as possible such poisons as are unavoidably introduced into the body.

The chief organs for such elimination are the kidneys, and water is the chief agent for the elimination. Carrel has kept the heart tissue of a chicken alive in the laboratory by periodically washing out the poisons pro-

duced by its own life processes. R peatedly it became senile, and about to d but was at once rejuvenated by a thorou washing out.

The blood needs a continuous supply water, and if it does not get its requir quota otherwise, it will absorb water fro the colon, or other tissues, thereby receivi poisons as well, and leaving the bowels d and constipated.

People who habitually have drunk to little water, while otherwise living und hygienic conditions, often experience a r markable increase of health and energy b attending systematically to this simple b important need.

Much of the benefit ascribed to miner waters is due to the water. Regulation diet, exercise, sleep, change of scene, an water are entitled to the credit for the r storative influence of the famous spas. Bu mineral waters that contain much miner matter, especially purgative waters, should b used with great caution.

There is no particular advantage fro very free water drinking as some practis it, for example, ten to sixteen glasses dail Indeed, in the case of certain invalids, th may overwork the kidneys, and ove burden the stomach and heart. Excess i

particularly to be avoided and the normal limit not exceeded where heart or kidney diseases exist.

People who neglect to drink sufficient water often show a urine of high density, 1,025 to 1,030, and suffer from symptoms of intestinal absorption. Headache, muscular and neuralgic pain, dulness and lack of concentration are some of the symptoms of this condition. Indican in the urine is sometimes an evidence of such absorption.

Normally our sense of thirst should be our guide to the right amount of water. But in a large number of people, without their realizing it, the sense of thirst has become so blunted that they do not know when they need water. No rule of hygiene is easier to obey than water drinking and yet many suffer by failure to follow it. Business men, after being advised on this subject by the Life Extension Institute, have sometimes kept themselves reminded of their need for internal moisture by charging an attendant with the duty of bringing them a glass of water in the middle of the morning and in the middle of the afternoon.

As already suggested, a good rule is to drink six glasses of water daily, one on rising, one at each meal, one in the fore-

noon, and one in the afternoon. A larger amount should, of course, be taken when freely perspiring.

Section II—Evacuation

Next to the kidneys, the bowels serve to eliminate body poisons. Water drinking, as we have seen, serves to facilitate elimination both through the kidneys and through the bowels by preventing the absorption of the colon poisons into the blood and their consequent transfer from bowel elimination to kidney elimination.

If the human body be likened to a steam-engine, its wastes correspond to the ashes.

Retention of Body Wastes

The injury which comes from the retention of the body's waste products is of the greatest importance. The intestinal contents become dangerous by being too long retained, as putrefying fecal matter contains poisons which are harmful to the body. Abnormal conditions of the intestines are largely responsible for the common headache malady, and for a generally lowered resistance, resulting in colds and even more serious ailments. Constipation is extremely prevalent, partly because our diet usually lacks bulk or other needed constituents, and so retards elimination, but

artly also because we fail to make the effort
› eliminate regularly, thoroughly, and often.
Constipation, long continued, is by no
eans a trifling matter. It represents a con-
ant and cumulative tax which often ends
ı very serious consequences.

Free water-drinking between meals when the stomach is empty, and especially before reakfast, is beneficial in constipation. Free ater-drinking at meals may prove consti-ating. Excess of water should be avoided 7 the very feeble or those suffering from eart trouble or dropsy.

Water-Drinking

The best regulators of the bowels are ater and foods. Foods should possess ıfficient bulk to promote the action of the testines and should contain a due amount ' laxative elements. Foods which are espe-ally laxative are prunes, figs, most fruits ccept bananas, fruit juices, all fresh vege-bles, especially greens of all sorts, wheat-an, and the whole grain cereals. Oils and ts are also laxative but can not be used in ıfficiently large quantities to produce very xative effects without producing loss of ppetite. Foods with the opposite tendency e rice, boiled milk, fine wheat-flour in ead, cornstarch, white of egg.

Laxative Foods

The use of wheat-bran in cereals, in bread,

Bran and Agar-Agar

and even in vegetables is a preventive of constipation, as is also the use of agar-agar an oriental seaweed product. This is n digested and absorbed, but acts as a wate carrier and a sweep to the intestinal trac It should be taken without admixture wi laxative drugs.

Mineral Oils

Purified paraffin oil is especially good an intestinal lubricant to assist the food slip through the intestinal tube at th proper rate of progress. Taken sever times a day, oil may retard secretion of ga tric juice and also interfere with absorptic of food. Light weight people should ther fore take it on retiring and use it wi caution.

Avoiding Drugs

It is advisable, in general, to avoid catha tics except under medical supervision, sin certain drugs are often very harmful wh their use is long continued, and the long they are used the more dependent on the the user becomes. Laxative drugs, ev mineral waters, should never be us habitually.

Enemas

The occasional, but not habitual, use an enema (with warm water followed ways by a second enema of cool water, prevent relaxation) is a temporary e pedient.

The much advertised "internal baths" ith special devices are often harmful and hould be avoided.

Massage of the Colon

Massage of the abdomen, deep and thorugh, with a creeping movement of the ends f the fingers on the left side of the abomen from above downward, also promotes ie process of defecation.

The normal man and woman should find o difficulty in having complete movements egularly two or three times a day by ierely living a reasonable life, being careıl especially to avoid overfatigue, to inude sufficient bulk in the food, to take regular exercise, including, in particular, breathig exercises, and to maintain an erect carage.

Many people fail to correct constipation y diet because they do not eat enough of ie foods recommended. Bulky green vegeıbles and fruits are of low fuel value and rge quantities may be eaten without overıtrition. Enough should be eaten to proıce the bowel action necessary, avoiding, course, overloading or irritating the omach or bowels.

Low-Seated Water Closets

High-seated water closets, so often found ı institutions, hotels and private houses,

often favor constipation, as they do not per
mit of the proper physiological attitude i
defecation. They prevent the individua
from exercising abdominal pressure so es
sential for this function. Such seats shoul
be made much lower than they are, or th
feet should rest on a foot-stool, in order t
attain the proper attitude for thoroug
emptying of the intestine.

Number of Defecations

Observations on the manlike apes sho
that they defecate three or four times
day. Few of the human family have suc
ideal movements. Millions are conscious o
some shortcoming in this regard, and doubt
less millions more suffer from some short
comings of which they are not consciou
Many believe they have free movement
when actually they are suffering from
sluggishness in the rectum and other part
of the lower intestine. A rectal exami
nation often reveals unsuspected feca
residues.

Establishing Proper Habits

The natural instinct to defecate, like man
other natural instincts, is usually deadene
by failure to exercise it. Civilized life make
it inconvenient to obey this instinct a
promptly as, for instance, a horse doe
The impulse to go to stool, if neglected eve
five minutes, may disappear. There are fe

ealth measures more simple and effective han restoring the normal sensitiveness of his important impulse. It may require a ew weeks of special care, during which old water enemas at night, following evacation by paraffin oil injection, may be eeded. It would be an excellent rule to isit the closet immediately after the noon nd evening meals, as faithfully as most eople do after the morning meal, until the eflex is trained to act at those, the most atural, times for its action.

Before leaving the subject of intestinal oisoning, we may here again mention the nportance of avoiding the poisoning which omes from too much protein. This poisonng is probably due largely to the decompoition of protein in the colon.

One proposed method for reducing this deomposition of protein is through the use of ilk. It is no longer thought that sour milk as any advantage over other forms of milk in nproving the bacterial flora of the intestine. 'rofessor Rettger and others have shown hat it is not possible as Metchnikoff thought o implant the Bulgaricus bacillus in the inestine. It is possible, however, to implant he Acidophilus bacillus and to greatly reduce he putrefactive forms of bacteria that flour-

Use of Sour Milk

ish in the average adult intestinal canal. Th Acidophilus bacillus thrives on milk suga and it is this factor in milk which is respons ble for such benefits as have been experience in the administration of sour milk. It i claimed that reliable cultures of Acidophilu bacilli, especially when administered wit liberal quantities of milk or milk sugar, wi quickly transform the bacterial flora to th types prevailing in early life of a non-putre factive form.

Evidences of Injury

The odor and character of the stools ar indicative of the extent to which our diet i injuring us. The odor is less offensive i the diet is low in protein and thoroughl masticated.

Section III—Posture

One of the simplest and most effectiv methods of avoiding self-poisoning is b maintaining an erect posture. In an erec posture the abdominal muscles tend to re main taut and to afford proper support o pressure to the abdomen, including the grea splanchnic circulation of large blood-vessel In an habitual slouching posture, the bloo of the abdomen tends to stagnate in th liver and the splanchnic circulation, causin

feeling of despondency and mental con-
usion, headache, coldness of the hands and
eet, and chronic fatigue or neurasthenia,
nd often constipation.

A slouching attitude is often the result of
lisease or lack of vitality; but it is also a
ause.

The "Consumptive Stoop"

There is some reason to believe that "the
onsumptive stoop" leads to tuberculosis
partly through the lowering of resistance
esulting from the poisoning produced by a
hronically relaxed abdomen.

There is no present evidence, however,
hat only flat-chested people are susceptible
o tuberculosis. Tuberculosis may occur in
ny type of chest.

Many persons who have suffered for years
rom the above-named symptoms have been
elieved of them after a few weeks of cor-
ect posture, sometimes reenforced by the
rtificial pressure of an abdominal sup-
porter and by special exercises to strengthen
he abdominal muscles.

Lying face downward with a pillow under
he abdomen presses the blood out of the
ongested splanchnic circulation.

Breathing and Posture

Breathing exercises are also very useful
or correcting the chronic evils of bad pos-
ure. Exercises taken when lying on the

back, by raising the legs or head, strengthe the abdominal muscles. Slow, deep breath ing, through the nose, while lying on th back, with a weight on the abdomen, suc as a bag of sand—2 to 4 lbs.—is beneficia

Standing and Walking

In walking, the most common error is t slump, with the shoulders rounded, the stom ach thrust out, the head thrust forward chin up, and the arms hanging in front o the body. To those who walk or stand i this fashion, let it be known that this is th "habitus enteroptoticus," or asthenic droop It is characteristic of those with weal muscular and nervous systems.

To set the shoulders back and squar them evenly, to keep the chest high and wel arched forward, the stomach in and the neck perpendicular, like a column, and the chin in, are simple fundamental measures tha most people know and many people disre gard.

One should have a sense of the firmness or tautness of the abdominal muscles and no of flabby relaxation. When one changes a slouching posture into an erect posture there is a sense of having reversed the way the body hangs, as it were, on the spinal column.

After years of wrong posture it is difficult

at first to get the knack of true posture. But when this is found it gives a curious sense of poise and ease.

The war has given to millions of men, and women also, the desire to have a military carriage, and created a new appreciation of an erect posture from an esthetic point of view.

The perfect physical poise which places the muscles, organs, circulation, and even the brain and nervous system in harmonious relationship, adjusted for the best achievement, is well exprest in sculpture dating back to 500-600 B.C., when the Spartans attained supremacy in Greece. This same poise and symmetry is shown in modern sculpture of fine types of manhood and womanhood.

The Feet

It is not enough to have an erect carriage and a well-poised head. We must also have well-directed feet. It is pitiable to think how the work of a fine head may be impaired by misdirected feet. Weak foot, and its final stage, flat foot, are more common among women than they are among men, because it is not a purely local condition in the arch of the foot, as so many suppose, but primarily due to a general weakened condition of the leg muscles that support the arch. The more vigorous exercise of boys as com-

pared to that of girls protects them in some degree from this malady, and, also from the hideous and deforming types of shoes with pointed toes which contribute to weak feet.

Toeing Straight-forward

Weak feet are gradually converted into flat feet by faulty standing and walking posture and lack of leg exercise. Toeing out, whether walking or standing, so commonly noted among girls and women, places a great strain upon the arches of the foot. The correction of this fault by persistent toeing in, Indian fashion, and daily exercise of the leg muscles and wearing of proper shoes, will do much to prevent flat foot.*

Chairs

Not only in standing, but in sitting, erect posture has been found to be a much more important factor in the maintenance of good health than is generally supposed. A rocker, or any other chair which tilts, is restful to the abdominal circulation, if the lower back is properly supported. Bad posture is common among sedentary people. The ordinary chair invites it. Every chair should be modeled like most modern automobile seats, on a curve to fit the back. Almost any chair can be corrected by placing a cushion so as to support the hollow of the back of the sitter. The responsibility for correct posture rests,

* See SUPPLEMENTARY NOTES for detailed instructions.

however, on the individual and not on the chair.

Sitting

In sitting at a desk or table, when reading or working, the common fault is to adopt a sprawling attitude, with the shoulders hunched up, the elbows stretched outward, the body too far away from the desk or table, and the weight resting on the buttocks. Very often the desk or table is too high and the arms can not rest easily upon it, thus causing a continuous strain on the structures around the shoulder-joints.

To correct this fault, use if possible a sufficiently high chair with a back that curves forward. Sit well back in the chair, but close to the desk, so that the fleshy inner part of the forearms may rest easily upon its surface without pushing up the shoulders.

When it is necessary to lean over a desk, acquire the habit of inclining the body forward by bending at the hips and not by distorting the chest.

The arms should hang easily from the shoulders and the elbows should not rest upon the table. The shoulders should be evenly square, as in the correct standing posture. In right-handed people, the light should fall over the left shoulder or directly from above. The body should rest upon the full

length of the thighs, not solely on the buttocks, and the feet (not legs) be crossed and resting lightly on the ground on their outer edges. In other words, the position should be freed from strain, especially strain of special groups of muscles.

Pains, erroneously ascribed to rheumatism or sciatica, are often due to faulty posture. Writer's cramp and many other needless miseries are often caused by neglect to develop proper postural habits in working or reading.

Posture in Children

In children faulty posture may mar the future of the individual by causing spinal curvature and physical deformities that interfere with physical and mental efficiency throughout life, and often lower the resistance to disease. Deep breathing through the nose and "setting up" exercises are of incalculable importance in such cases.

The various types of faulty posture are so numerous that they can not be listed here. Having once grasped the meaning of correct posture, however, we can form a standard for ourselves, and any departure from this standard should be looked upon as a menace to health. As in the case of eye-strain, work, worry, and drink, much depends on the original physical and mental

endowment of the individual as to how much harm results from faulty posture. But always some harm results.

Teaching Correct Posture

The teaching of proper standing, proper walking and proper sitting should be a part of all school discipline as it is at military schools, especially as there is the temptation to crouch over the school-desk—which is usually the source of the first deviation from natural posture. An infant before it goes to school usually has a beautiful, erect carriage, with the head resting squarely on the shoulders.

Posture and Character

A correct posture is attractive from an esthetic point of view, and for that reason is sure again to become fashionable with women, after a due reaction from the present slouching vagary. It is also closely associated with self-respect. We know that any physical expression of an emotion tends reflexly to produce that emotion. Therefore, not only does self-respect naturally tend to brace a man's shoulders and straighten his spine, but, conversely, the assumption of such a braced-up attitude tends to "brace up" the man's mind also. Tramps and other persons who have lost their self-respect almost invariably slouch, while an erect carriage usually accompanies those

feeling their respectability. We jokingly refer to those whose self-respect verges on conceit as "chesty," while we compliment one who is not so extreme by saying, "He is no slouch."

Between the slouch and slink of the derelict and the pompous strut of the pharisee, or the swagger of the bully or the dandy, there is the golden mean in posture, which stands for self-respect and self-confidence, combined with courtesy and consideration for others.

Section IV—Poisons from Without What

The poisons which hitherto have been mentioned are those developed within the body, especially in the intestine. It is not alone important to keep down the total amount of poisons produced within the body. It is equally important to exclude the entrance of any additional poisons from outside.

Habit-forming Drugs and Patent Medicines

Among the poisons which must be kept out of the body should be mentioned habit-forming drugs, such as opium, morphine, cocain, heroin, chloral, acetanilid, alcohol, caffein, and nicotin. The best rule for those who wish to attain the highest physical and mental efficiency is total abstinence from all substances which contain poisons, including

spirits, wine, beer, tobacco, many much-advertised patent drinks served at soda-water fountains, most patent medicines, and even coffee and tea. Many so-called patent or proprietary medicines contain habit-forming drugs, especially morphine, coal-tar preparations, caffein, and alcohol, and depend largely for their sale upon the effects of these harmful substances. Harmful preservatives and adulterants in foods, such as saccharin, should also be avoided.

Reducing the Habit

For some persons the easier, tho not the ideal, mode of improvement will be by substituting the milder drugs for the stronger—beer for spirits, weak tea for beer. The exact extent to which the milder poisons are injurious has not yet been scientifically settled. Tea, for instance, if very weak and used moderately, is, presumably, not injurious to any marked degree to healthy persons. The trouble is, however, that sensitive people do not keep moderate. In fact, the natural tendency of drug-craving is in the opposite direction, from weak drugs to strong ones, as from beer to spirits. In actual fact, it is much easier to abstain than to be moderate. It should also be noted that the lax spirit in which many people make an exception to the rules of health in favor

of some mild indulgence is very likely to lead to the making of many other exceptions until they are, without knowing it, carrying a heavy load made up of scores of little items of harmful indulgence. Moreover, experiments at the Pasteur Institute have shown that the long-continued use of very minute doses of poison ultimately produces appreciable harm. Each person must decide for himself how far he chooses to depart from previous habits or common customs for the sake of physical efficiency. The object here is to state exactly what, in our present state of knowledge, is believed to be the truth.

Those with feeble digestions or unstable nervous systems are especially harmed by these poisons. A family history of nervously inclined people calls for rigid care in such matters.

Alcohol

Scientific experiments have resulted in the interesting discovery that the alleged "strength" obtained from beer, ales, and all intoxicating beverages is a delusion and a snare. The poison simply gives a temporary feeling of greater strength through paralysis of the nerves which make us feel fatigue. But the strength does not exist. On the contrary, the user of alcohol in excess is weaker

fter taking it. Special classes of workmen ave been tested as to their efficiency under quor in small amounts and without it enrely, and it was invariably found that the quor was a handicap, altho invariably the orkmen *thought* they could work harder by s aid! Alcohol numbs the sense of fatigue nd so deceives the user. It is not a stimunt but a narcotic. The habit of taking a ocktail before meals is doubly harmful, ecause it is taken on an empty stomach nd because it poisons the system more uickly than when mixed with food and reined in the intestines.

Alcohol and Infectious Diseases

It is well known that people who indulge alcohol show less resistance to infectious seases than abstemious individuals. The aralysis of the white blood-corpuscles is ne of the strong arguments against the use alcohol. The experience of life insurance mpanies in England and America has early shown that even the "moderate" use alcoholic beverages shortens human life.*

Dr. Stockard has also shown in mice, on hich he has experimented, that the effect alcohol on the germ-plasm is distinctly jurious. It is a fair inference that the

* See "Alcohol" in SUPPLEMENTARY NOTES.

use of alcohol by parents tends to dama their offspring.

Tobacco

The evils of tobacco have not been much studied and are not so well unde stood as those of alcohol. But every athlet trainer observes that the use of tobac lessens physical fitness. The ordina smoker is unconscious of this and often d nies it. He sometimes says, "I'll stop smo ing when I find it hurting me; it doesn hurt me now." The delusive impressi that one is well may continue long aft something has been lost from the fitness the body, just as the teeth do not ache un the decay has gone far enough to reach t nerve.

At Yale and at Amherst it has been foun by actual measurement, that students n using tobacco during the college course h gained over the users of tobacco in weig height, growth of chest, and lung capacit

Professor Pack, of the University of Uta finds that tobacco-using athletes are di tinctly inferior to those who abstain. Pr fessor Lombard, of the University of Mich gan, finds that tobacco lessens the power the voluntary muscles, presumably becau of the depressing effect on the central ner ous system. There is also much exper

ental evidence to show that tobacco in ani-
als induces arterial changes. The present
ell-marked upward trend of mortality from
seases of the arteries offers a good reason
or heeding such evidence and taking the
ıfe side in every controversy regarding it.*
ı view of the tremendous increase in the
onsumption of tobacco due to its use by the
oldiers this subject is of widespread im-
ortance and requires close scientific study.
he tobacco problem bids fair after the war
become one of the major problems of
ublic and private health.

Germs

The poisons so far mentioned are limited
the amounts taken. Infections with
erms, however, bring in poisons, the quanti-
es of which tend to increase with the multi-
lication of the germs. It is, therefore, espe-
ially important to avoid infections. We
hould not depend altogether on the protec-
on of our health officers. We must guard
ur own individual bodies.

Colds and La Grippe Germs

Infections enter the body through the skin
r mucous lining. The common cold is be-
eved to enter by the nose. We may avoid
xposure to infection from grippe and com-
on colds by keeping away from congested
ublic places when there is an epidemic of

* See "Tobacco" in SUPPLEMENTARY NOTES.

gripppe or colds, or when we are ourselve fatigued or for any reason likely to catc cold.

The infections of common colds are alway to be found in the nasal passages and b come active when the individual is subje to fatigue or indigestion or both. The li bility to catch cold is greater when th mucous lining is injured. Nasal douches a injurious and impair the protective abilit of the mucous membrane. They should b used only on prescription. A very gentl warm spray of weak salt and water may b used when the nose is filled with soot an dust. The fingers should be kept from th nose. Handkerchiefs should be frequentl changed, or small squares of gauze used an subsequently burned.

Tuberculosis Germs

The germs of tuberculosis may be inhale from sprayed moist sputum or from drie sputum. Scientific opinion now favors th view that children are often infected by co taminated milk through the digestive trac Destruction of the sputum of consumptive and protection of the milk supply, sanitar dairies, exclusion of tuberculous cows an hogs, and pasteurization of milk, are in portant preventive measures.

Raw milk also may convey germs of septic ımmer complaints.

Spitting on the floor spreads disease as do ɔughing and sneezing, especially when the ɔray they cause is in front of other peoles' faces.

Suitable wire netting will guard us from ıalaria and yellow fever, the infections rought by mosquitoes and flies. As some ne has said: "A yard of screen in the winow is better than a yard of crape on the oor." The greatest triumph in connection ith the building of the Panama Canal was ot the engineering but the reduction in the eath-rate among the workers, which, on acɔunt of these insect-borne diseases, had reviously prevented the successful execuon of the undertaking. Mosquito borne Malaria and Yellow Fever

Not only is it desirable to screen from ıosquitoes, but to put oil on any body of 'ater where they breed. Even a small uddle can breed millions of mosquitoes. No npty tin cans should be allowed to collect bout the kitchen door; they gather rain'ater and soon breed mosquitoes.

We take in many disease germs through ɔod or drink. Every year 300,000 people ı the United States are victims of typhoid. 'o elude the typhoid-germ we need first of Typhoid-free Water

all pure water. Where hygienic water ha been used a very large proportion of th deaths from typhoid has been eliminate But when one is in doubt as to the purity c water, it is advisable to boil water in orde to destroy possible typhoid germs and othe dangerous germs and impurities. Wher boiling is not feasible, it is desirable to us chlorinated lime (ordinary bleaching pow der) in the drinking water (one part t 200,000—shake up and leave several min utes). If water of doubtful quality has t be drunk, it should be at the middle or en of a meal when the healthy stomach con tains plenty of gastric juice, which to limited extent has the power to kill germs

There is also danger from germs in swim ming-tanks that are not filtered or refille constantly, or chemically purified as b chlorinated lime.

Typhoid-free Milk

Another measure for avoiding typhoid i to pasteurize milk. Food that is liable t contain typhoid or other dangerous germs such as raw oysters, and milk from typhoid infected localities, should be avoided.

The "Typhoid-fly"

In protecting the food against all kind of impurities which injure the body, we mus remember that the carrier of typhoid fever the common house-fly, deposits typhoi

erms on the food, through which the germ taken into the system. The most effective ethod of fighting flies is by preventing ieir breeding. Their favorite places for iis are horse-manure, but they will breed ı almost any mass of fermenting organic aterial. The ordinary manure pile is a ıblic nuisance and not an efficient way of onserving fertilizer. Screened or well aled vaults or pits should be used or the anure should be removed and distributed ı the fields at frequent intervals, at least ıce a week. There is probably less loss of rtilizer by such distribution even of green'' manure than in the ordinary barnırd pile that is subject to the solvent action rain for many months. Garbage-pails ıould be kept tightly covered. Fly-paper ıd fly-traps should be used. Houses should screened, and, in particular in the pantry, ıe food itself should be screened. Flies re usually thirsty in the morning. By exosing a saucer of one per cent. of formalin olution, the flies will be tempted to drink iis morning cocktail and pay the deathenalty.

Flies occasionally gain entrance to the ouse in spite of the most careful screening. he fumes of burning Pyrethrum powder

(Persian insect powder), used in the pr portion of 2 lbs. per 1,000 cubic feet of a space, will either kill or stupefy flies an mosquitoes, so that they may be swept u and effectually destroyed. It may be di tributed in pots and pans, and ignited afte sprinkling with alcohol.

Other Vermin

Ticks should also be carefully exterm nated, as they are sometimes responsible fo such diseases as Rocky Mountain spotte fever, African tick fever, and other infec tions. The bedbug is also by no means th harmless creature which it is generally con sidered. To its credit are placed such mala dies as relapsing fever. The flea has bee responsible for such terrible diseases as th plague, and often is carried by rats to huma habitations. The louse is one of the dires offenders in the insect line, as it must tak the responsibility not only for many case of typhoid fever, but for the dread plagu of typhus, which has ravaged the Europea armies, also for so-called trench fever.

Hookworm

Hookworm disease is to be avoided by no treading barefoot on ground polluted by vic tims of the disease, by preventing soil-pollu tion through the proper disposal of huma excrement, and by screening all water closets.

Cleanliness

Cleanliness is important for avoiding infections, and bathing is important for cleanliness. The hands, the face, and finger-nails should be kept clean, especially before meals. Any cut or crack in the skin or mucous membrane may let in germs when the spot is dirty or is touched by dirty hands. This is why surgeons are so scrupulously clean. Super-cleanliness probably also explains the extraordinary low mortality of Jewish rabbis as a class.

The Japanese were pioneers in war hygiene. Their custom of bathing before going into battle is being followed so far as possible by Western nations. Clean bodies and clean clothes protect the soldier from tetanus (lockjaw) and other infections following wounds.

The need of cleanliness is particularly great for those who work in factories, mines, and other places where dirt is likely to be carried to the mouth by the hands. Probably many diseases get a foothold in this way without the victim realizing in the least that they were due to his carelessness and lack of cleanliness.

Shaking hands, when the hands are soiled, probably spreads disease very considerably.

Here, as elsewhere, esthetics and health go hand in hand. A person who does not bathe daily is pretty certain to carry on his skin some perspiration which, while he may be unaware of it, gives forth an offensive odor.

Cleanliness is promoted by perspiring prior to bathing. Every one knows the exhilaration which follows a healthy perspiration. Of course, the most beneficial method of securing perspiration is the method applied to the trotting horse—vigorous exercise. In fact, one of the benefits of exercise

Perspiration

is perspiration. When a person can not or will not take exercise, perspiration can be induced by hot baths. Such extreme measures ought not, however, to be taken too often. How often will depend on the corpulence and other circumstances of each individual. Sweating may be overdone, and should never be pushed to the extent of exhaustion. The function of the skin in removing wastes from the body is much less important than formerly supposed. The advice of a physician is desirable. It should be remembered that all of us perspire insensibly as well as visibly.

Sex Infection

Some of the most serious and widespread, altho usually unmentioned, infections are those from the venereal diseases, with a

whole train of terrible consequences, such as blindness, joint-disease with heart-complications, peritonitis, paralysis, and insanity. They are to be avoided by living a life hygienic and clean, not only in body but in mind and heart. From even the narrowest interpretation of hygiene, a decent life is necessary for the maintenance of health. This is a special subject on which most people are extremely ignorant. It is seldom realized, for instance, that *all prostitutes are diseased.* This was found to be the case in an investigation in Glasgow.

Some have questioned this statement, but exceptions to this rule are not numerous enough to lessen the menace materially from the class. It should be further borne in mind that practically all immoral women are diseased, whether they come within the class of professional prostitutes or not.

Dr. Rosenau says: "Every boy and girl, before reaching the age of puberty should have a knowledge of sex, and every man and woman before the marriageable age should be informed on the subject of reproduction and the dangers of venereal diseases. Superficial information is not true education. On the other hand, it is a mistake to dwell unduly upon the subject, for in many instances

the imagination and passion of youth are inflamed by simply calling attention to the subject.''

The Life Extension Institute can furnish special pamphlets covering this important topic.

The loss of citizens to the State from the sterilizing influence of gonorrhea upon the productive energy of the family, and the blighting destructive effect of syphilis upon the offspring offer extremely serious problems for preventive work.

It is a matter of grave significance as affecting our social structure that the venereal sick-rate in our fighting forces is less than that in civil life, partly due to the restriction as to alcohol in the camps and the provisions made for wholesome games and amusements for the soldier, as well as disciplinary measures and medical prophylaxis. It has been demonstrated that the soldier can be healthy, happy and efficient without dissipation or drugs such as alcohol.

Section V—Teeth and Gums

There is one source of poisoning and infection so universal as to need special mention. This is infection through the mouth. Considered from the standpoint of efficiency,

the modern mouth is out of adjustment with modern conditions—or, perhaps we should say, modern conditions are out of adjustment with it. The mouth contains numerous bacteria that flourish within its portals, but the mouth secretions and the mucous membranes do not seem to have the protecting power which is often manifest in other regions of the body and which protects an animal in a state of nature. Wild animals are not subject to caries or dental decay, as are man and domesticated animals.

Mouth-dangers

There are two forms of mouth-danger that should be clearly differentiated. Dental caries, or decay, is at first largely a chemical process and affects the tooth proper. Pyorrhea, or Rigg's disease, affects the tissues surrounding the root of the tooth, and is accompanied with infection by pus bacteria, and possibly also by animal parasites, termed endameba. Scrupulous cleanliness of the mouth largely prevents both of these maladies.

Dental Decay

In caries, or dental decay, plaques or films of mucin from the saliva form on the tooth-surfaces and enclose bacteria and particles of carbohydrate food, which undergo fermentation with the formation of lactic acid, which dissolves the lime salts on the surface

of the teeth, leaving only the organic matter. This organic matter is then attacked by bacteria. Putrefaction sets in, and you have a cavity. This cavity is, of course, a menace, as it harbors various forms of bacteria, which may infect the general system through the root canals, or the digestive system by being swallowed with the food, and also gives rise to infection at the root-tips.

Pyorrhea

Pyorrhea is an infection of the gums or tooth-sockets. It begins beneath the edges of the gums that have been injured and especially where there has been an accumulation of tartar or lime-deposit. As the infection progresses and destroys the membranes that attach the root of the tooth to the socket, a pocket is formed around the root, and the tooth becomes loosened. It is said by competent judges that this disease is responsible for far more loss of teeth than is decay.

Systemic Injuries from Mouth Infection

But this is not the only evil. In the pocket pus is continually being formed and discharged into the mouth and swallowed. Also, as the teeth rise and fall in their diseased sockets in ordinary chewing, bacteria are forced into the circulation and may be carried to distant parts, where they work harm according to their nature, selecting

tissues for their operation in which they can best thrive.

The most dangerous form of mouth infection is infection at the root tip, induced by organisms of low vitality that do not form pus but are, nevertheless, often very virulent (streptococcus viridans) and may cause serious disease in other parts of the body.

It was formerly supposed that the ill-effects from such conditions as dental abscess and other pus foci were wholly due to the toxins or poisonous products thrown into the blood-stream by the bacteria at the focus. It is now known, however, that the bacteria migrate into outside tissues through the blood- and lymph-streams. In joint affections, they clog and obstruct the small blood-vessels, interfering with the nutrition of the joint-tissues, causing deformity and enlargement, as in arthritis deformans, as well as in acute inflammation, such as rheumatic fever. Indeed, this condition of sub-infection, or "focal infection," is coming to be recognized as a far more important cause of disease than the time-honored autointoxication, a term which has been greatly abused and misused.

Focal Infection

This focal infection can arise in many parts of the body beside the tooth sockets,

i.e., the tonsils, the nasal cavities, middl ear, prostate gland and seminal vesicals anc appendix.

Autointoxication

The term "autointoxication" should prop erly be restricted to conditions where poisor arises from changes in the tissues or in the activities of cells or organs, whereby sub stances are released into the circulation in quantities harmful to the organism; in other words, where the secretions of the body are altered, either in character or quantity, to such a degree as to cause injurious effects such as over-activity or under-activity of the thyroid gland, or suprarenal gland.

The poison from undigested food, or from decomposing intestinal contents, should be termed "intestinal intoxication," or "tox emia," rather than "auto-intoxication," or "self-poisoning," as it is actually due to in fection from outside sources. Intestinal toxemia is, no doubt, a fairly frequent cause of illness, but it has lately been shown that stagnant bowels may cause true infection by micro-organisms that penetrate the tissues and that many conditions ascribed to in testinal stagnation and the resultant chemical poisoning may actually be due to focal in fection, or subinfection, arising in other re gions.

The light that has lately been thrown on hronic sources of focal infection has cleared ıp many of the mysteries surrounding the ausation of certain obscure affections—hronic rheumatism, arthritis deformans, ertain forms of anemia, goitre, chronic ıeart and kidney troubles, diabetes, ulcer f the stomach, duodenum, etc., and other orms of chronic disease, especially those hat have proved resistant to known methods f treatment.

Lowered Resistance

There are many cases where the so-called ocus has apparently become established because of general bodily neglect and a general lowering of resistance, in which the ocus, even tho it be the mouth, has participated, and permitted the successful activiies of germs or parasites. After the focus as been established, however, it is often an mportant and may be a deciding factor in eeping up the general diseased condition f the body.

This principle of focal infection, well esablished as it is, should not be accepted too iterally, or given too wide an application, ut no one can question the importance of reventing the bacterial hosts of the mouth rom getting into the system, or the impor-

tance of getting them out, if we have unwarily permitted them to enter.

Not all the ills that flesh is heir to are caused by mouth-infection, but enough of them are to more than justify a vigorous and world-wide campaign for the better care of the teeth and for a thorough search for mouth infection in every case of obscure disease.

Keeping the Mouth Aseptic

Gum infection is not always due to conscious neglect. Some people do not know how to cleanse the teeth properly. Others have tissues of low resistance, and need to give extra care to tooth- and gum-cleansing under the closest dental supervision. Others have spent large sums for dental work that has filled the mouth with crowns and bridges difficult to keep aseptic or surgically clean.

Over-dentistried Teeth

There are various means which the individual can use to prevent or cure these dental evils.

General Hygiene

First, the importance of thorough attention to general personal hygiene, in order that a general resistance to mouth infection may be built up, can not be over-emphasized.

Vigorous Use of Jaws

The cultivation of normal eating habits with respect to the vigorous use of the jaws by thorough mastication, and the eating of hard, resistant, crusty foods every day is

ıe next desirable means of tooth and gum ygiene.

Cleansing

A leading dentist expresses the hope that ome day the human animal, like other aniıals, will, through a correct diet, be able to et along without the aid of the tooth-brush; ut he adds that, in the meantime, we need ɔ advocate more tooth-, gum- and tongueleaning rather than less. Teeth should be leaned night and morning and after each ıeal, if possible, by rapid circular rotation f the brush, brushing from the gums toward he tips of the teeth, including both sets of ums in the same stroke. Strong pressure is ot advisable. Rapidity of movement is the nportant point. This stimulates the circuation and increases the resistance of the ums and cleanses the teeth at the gum ıargins from the accumulations of tartar vhich are at first soft and easily removable y a brush.

Kind of Brush

A brush should be used with bristles that re of different lengths, so that the innermost revices of the teeth may be reached. Pure vhite soap and a medium or soft brush used igorously with a rotary motion will effiiently protect gums and teeth.

It is not generally known that decomosing material tends to collect on the

root of the tongue and are more often re sponsible for foul breath than stomach condi tions. Scrape the root of the tongue and not whether there is odor from the scraping.

Tongue Brushing

The root of the tongue should also b carefully cleansed with the tooth-brush. B taking care not to hit the roof of the mouth gagging is avoided.

Tooth-Powders and -Pastes

Tooth-powders and -pastes may be used but should not be the main reliance. Per haps once a day for their use is ofte enough. Some powders, if used too freely are liable to thin the enamel of the teeth unduly.

Dental Floss

The use of dental floss silk between the teeth, provided care is taken not to press i against the gums, is also helpful.

Emetin

A number of investigators have reported the presence of an animal parasite, the *endameba buccalis,* in all cases of pyorrhea and it is claimed that this parasite may be one of the causative factors of this disease Emetin, the active principle of ipecac, which has been successfully used in amebic dysentery, is now employed in the treatment of this trouble. Such a remedy should only be used in connection with thorough surgical treatment and dental prophylaxis. It is claimed that in the early stages of pyorrhea

mouth-wash composed of two drops of luid extract of ipecac to a half-glass of vater is very serviceable, and as at that tage a mouth-wash is entirely harmless, it hould be tried, especially as it is now laimed that some degree of pyorrhea or of ndamebic infection is almost universally resent.

Considerable doubt has been lately hrown upon the endamebic theory and it et lacks scientific proof. Ipecac does seem, owever, to check recession of gums and nay do so by its direct action on the gums nd not through any effect on the endameba.

Alkaline Dentifrice

For an alkaline dentifrice, there is nothing etter than lime-water, made from coarse, nslaked lime. Alkaline washes are very uperficial in their action, however, while ruit acids curdle and thus render removble the mucin plaques and prevent the fornation of tartar. They also cleanse the ongue and membranes of the mouth genrally, which may be important sources of nfection. These acids are found in grapeuice, orange-juice, apples, and vinegar. Such mechanical cleansing is particularly mportant before retiring, as it is usually luring the night that the most damage is vrought.

Food Acids

Erosion

The advice of the dentist should b
sought as to the condition of the teeth, espe
cially as to whether there is any erosion o
destruction of enamel, before using eithe
acid or alkaline washes exclusively.

Periodic Examination

Periodic examinations and cleanings b
the dentist are the only safe measures. I
the dentist has facilities for giving *pre
ventive* treatment by specially cleaning th
teeth, he should be visited every othe
month. If such a program is adopted, i
will generally be found unnecessary to visi
him for any other purpose.

Saving Teeth

Some dentists and physicians have unti
lately given too much attention to the savin
of teeth, without fully realizing the danger
of infection from the mechanical device
employed. The teeth should not be ex
tracted on mere suspicion and withou
proper effort to save them, but it is fa
more important to save a heart or a kidne
or a set of joints than it is to save a tooth
This is not to say that all bridge- and crown
work is improper, but that such work shoul
only be of a character that will permit o
surgical cleanliness in the mouth, and tha
such teeth should always be examined b
the X-Ray, when there is evidence of sys

emic disease in order to be sure that the roots and sockets are not infected.

Irregularities of Teeth

In early life the jaws should be carefully examined by both dentist and doctor in order to determine whether or not the proper development is taking place. If upper and lower teeth fail to fit well together, extra strain is placed upon certain teeth and the sockets are liable to injury and infection. Faulty development can often be corrected and deformities that interfere with proper mastication and place a strain on certain teeth can thus be avoided.

The Temporary Teeth

The temporary teeth should not be allowed to be lost by decay. Thorough dental and home care should prevent this. If cavities form, they should be filled under proper precautions and the teeth should be saved until the last minute, unless they are causing infection.

Teeth and Infectious Diseases

Amazingly good results from teeth-hygiene have been shown in a Boston asylum, which cares for over 300 children. Before the introduction of a dental clinic into this asylum, infectious diseases—diphtheria, mumps, scarlet fever, pneumonia, measles, whooping-cough, tonsillitis, chicken-pox, croup, etc.—had been occurring for four years at the rate of over 80 cases per

year, but for three years after the dental clinic was established the average was only 3 per year.

In a recent series of 10,000 routine X-ray examinations at the head office of the Institute, 60 per cent. were found with infected roots. Among 200 individuals there were 205 foci of infection found.

Prolonged treatment of infected teeth where systemic disease is present is hazardous. Extraction is the safer course. The benefit of the doubt should be given to the vital organs and not to the teeth.

Pulpless, or so-called dead teeth, especially those that have shown root tip infection even tho such infection has apparently subsided, are always points of least resistance. Such observation as we have had warrants the general counsel that teeth of this latter type be removed, altho conservative dentists more often advise to the contrary.

CHAPTER IV

ACTIVITY

Section I—Work, Play, Rest and Sleep

In order to live a hygienic life it is not only necessary, as shown in the foregoing three chapters, to supply the body with wholesome substances and to exclude unwholesome substances, but it is also necessary that the body should at times act, and at other times be inactive. There are two great forms of activity, work and play; and two great forms of inactivity, rest and sleep. All four of these are needed in the healthy life and in due relation to each other.

The Daily Rhythm

The whole personality should be utilized and energized in a daily rhythm. When, as too often happens, the equilibrium and mutual proportions of the various wholesome elements in a well-rounded life have been lost, the balance should be restored if possible the next day. If a physician has had his sleep broken, he should aim to make it up at the earliest opportunity. If the afternoon exercise has had to be omitted, an

extra amount should be taken as soon as possible. Some people find that while it is difficult to live a complete life every single day, it is quite within their power to give every element its due proportion in each week, taken as a whole. To go a step farther, when the balance has not been kept even in a week as a whole, the next week should be modified to compensate. But it is ideal to make the day, not the week, the unit. It is almost as absurd to relegate all our exercise to Saturday afternoon as to do all our eating on Sunday.

Adjusting the Proportion of Work and Play

It is distinctly unhealthful either to overdo or to underdo work, play, rest, or sleep. "Moderation in all things" is a rule that is particularly important in this realm. Not all people are in need of exercise, nor are all in need of rest; but almost every one needs to change his proportion between the two. To-day many people are suffering from too much or too little work. For instance, the increase in disease of the heart is often due to nervous overstrain combined with either too much or too little physical exertion.

The remedy for the evils of idleness is obviously to find some useful work which will inspire real interest and enthusiasm.

There are few things more necessary to a normal healthy life than to have purposeful work. It is one of the greatest blessings, but too many miss the joy of it; some because their work has gone to the extreme of drudgery, and others because it has shrunk into nothingness and futility. Work, when done with a zest, is a wonderful tonic. A great dream or ambition in life often balances personal ailments and nullifies heir potency. Sometimes people become ill because their personality, hungry for work, s given nothing but self-study to feed upon. This is the self-imposed curse of the idle rich.

Exertion of any kind is usually pleasant at first, and ought never to degenerate into nere drudgery. It may do so when too protracted or when the conditions are such as to destroy the worker's genuine interest n his work. Unfortunately the extreme division of labor in modern industry, with ts resulting monotony and impersonality, has largely destroyed the instinctive liking for work activity. Probably the chief cause of labor discontent is, in the last analysis, the joylessness of the working hours. This largely explains why the movement to reduce working hours is so strong, why so

little and so poor work is done and why therefore, wage-earnings are so small. Th problem of wages and hours would be o the way to solution if we could solve th psychological problem of adapting factor work to our human nature.

In order that the workman shall be in terested (and therefore effective and con tented), we must understand his psycho logical nature and satisfy his great funda mental instincts, such as the instincts o loyalty, self-respect, and pride in workman ship.

The modern Juvenile Court recognize that the boys who are arrested for throwin stones are often simply satisfying thei legitimate instincts, and that the best mean of preventing such conduct is to provid playgrounds.

Our soldiers abroad are kept at thei work not by their pay, but by the instinctiv impulsion of self-sacrifice, loyalty, and self respect. They are the same men whom w have expected to be contented at monot onous work motivated only by the desire fo pay. When they return from the absorbin pursuit of war to the humdrum of the work shops, they will rebel at mechanical indus try. We must make industry more whole

ome and healthful; not only by better sani-ation and ventilation, or by teaching the vorkman how to keep his bodily functions ;oing properly, but by enabling him to ob-ain mental health and live a complete all-round life.

Prevention of Over-strain

In addition to the great evil of labor with-ut the incentive and energy supplied by he instinct of workmanship, there are other ossible abuses to be avoided. Methods of reventing or correcting overstrain vary reatly, according to the kinds of over-train. In general, overstrain of any kind ends to overfatigue. Overstrain is to be voided, therefore, by paying heed to Na-ure's fatigue-signals as soon as they ap-ear. A very moderate degree of fatigue is erhaps normal, but anything that ap-roaches exhaustion should be avoided with he utmost care.

Working Hours

Working hours should be so arranged as o enable the worker to recuperate fully vernight, partly from sleep and partly rom the recreation enjoyed in leisure be-ween work and sleep.

Some factories are introducing a practise vhich might well be made general, of in-errupting the work in the middle of the norning and the afternoon by a ten-minute

recess during which the noise of machinery is stopt and the employees take calisthenics or simply converse or do whatever they individually choose.

Variety of Work

Variety of work is especially needed in modern times, when specialization tends to lead men to extremes. Changes in work which prevent a sense of monotony will greatly increase the power to work. A clerk will do more work, and do it more effectively, if he is occasionally allowed something else to do than to foot up columns.

Monotony and Interruption

If the monotonous strain of performing numerical additions is interrupted a few times daily, the adding faculty of the brain is given much-needed rest. Many men in the higher rank of workers complain of the many interruptions which they suffer, but if they would welcome these interruptions instead of allowing themselves to be irritated by them, each interruption would serve the purpose of a vacation. It is in this way that some of the greatest workers, like Gladstone, have been enabled to accomplish so much.

The strain of modern life is sometimes special rather than general. Often the strain comes on some one muscle or organ. Modern industry is so constituted that the individua

strains one part of the body while other parts are in need of exercise.

Eye-strain

One of the organs which is most commonly strained in modern life is the eye. In its modern use, the eye is constantly focusing at a short distance. To look at the horizon is therefore a rest. The reflex evils from eye-strain are great and numerous and are often incorrectly ascribed to entirely different causes. Headaches, nausea, and dizziness are especially frequent results of eye-strain. Probably some of the breakdowns in middle life are due primarily to the reflex effect of eye-strain.

Eye-strain is to be prevented by scientifically adapted spectacles, by care to secure the right kind of illumination, and in some cases by systematically resting the eyes. Reading on moving trains or looking for a long time at moving pictures may overstrain the eye. One should be especially careful not to read in a waning light or, on the other hand, to read in the glare of the sun. If one works facing a window, it is advisable to wear an eye-shade; otherwise there is a struggle between the tendency of the bright light to close the pupil and the tendency of the work requirement to keep it open.

In work-shops, machinery and work benches should be so placed that the worker are at right angles to or face away—or bes of all, obliquely away—from the windows. I many cases such a hygienic arrangement i also economical of factory space.

To offset the evils of a sedentary life, i is advisable to spend one hour daily, or a least 15 minutes, in some kind of vigorou physical exercises.

Mechanical Home Exerciser

The rowing-machine is probably the mos beneficial form of mechanical home exercis that is likely to be followed faithfully. Sim ple stretching in bed when one wakes up i helpful, especially if combined with breatl ing exercises.

Stimulating Heart and Lungs

The most beneficial exercises, as a rul are those which stimulate the heart an lungs, such as running, rapid walking, hil climbing and swimming. These should, c course, be graduated in intensity wit varying age and varying degrees of vitalit

Exercise After Meals

Gentle muscular activity after meals pr motes normal digestion and should be pra tised for a quarter or half an hour aft each meal, but violent exercises immediatel after meals should be avoided, as a larg amount of blood is then engaged by tl digestive system.

A very important fact for the average Outdoor Exercise in Winter
an to take into consideration is that, hereas he naturally gets considerable out-f-door exercise in summer, he allows it to pse in the winter. Such a decided change the amount of exercise is dangerous and hould be avoided by taking regular gym-asium exercise. Even tho a gymnasium is ot elaborately equipped, use can be made f such games as hand-ball, volley-ball, and ther available games.

Systematic exercise is important and bene- Enthusiasm in Exercise
cial, even when the individual finds it un-teresting. The idea, which is now spread oroad, that exercise in which one is not notionally interested is of no benefit, is uite incorrect. A gentleman who had this oinion was challenged to test it and eedily changed his mind. For an entire inter he faithfully attended a gymnasium, o it was an unceasing bore to him. To s surprize he found that he had never ent a winter in such good health.

But, altho exercise when self-imposed is holesome, exercise to which one is natu-lly attracted is more so. Golf, horse-ck riding, tennis, usually inspire en-usiasm, and enthusiasm itself is health-l. Walking may also do so, if the walk

has an object, as in mountain-climbing, when often the artistic feelings may be enlisted in the sport. Working out an ideal stroke in rowing, perfecting one's game in polo or other sports, are other examples.

The Greek Ideal

The Greeks lifted their sports to a higher level than ours by surrounding them with imagination and making them a training in esthetics as well as in physical excellence. The American idea is too closely connected with the mere wish to win and the performance of mere "stunts" and not enough with the idea of beauty of physique and control of the body. There is accumulating considerable evidence that college athletics often seriously injure those who engage in them, altho they were originated and encouraged for precisely the opposite effect.

Injuries from College Athletics

The value of exercise consists not in developing large muscles nor in accomplishing athletic feats, but in attaining physical poise, symmetry of form, and the harmonious adjustment of the various parts of the body, as well as in furthering the proper activity of cell-tissues and organs and the elimination of waste products.

Even those whose work is largely muscular, unless it involves most of the muscular system, may do well to exercise the unused

nuscles. In such cases, however, Nature ıerself produces to some extent the neces- ;ary compensation by what is known as the 'law of synergic movement,'' by which un- ısed muscles profit by the exercise of those vhich are used.

Exercise the Mind, Will and Emotions

Not only the functions of the body but hose of the mind require exercise—exercise n thinking, feeling, and willing. A person vho does not read or think loses some of ıis ability to read or think. The physical vorker, for instance, often allows his mind o become dull and sodden. The accountant ıdds up figures all day and has no chance o exercise his judgment or other mental aculties. In the same way a person who loes not exercise his artistic, poetic, or af- ectional side will suffer its atrophy. The plaint of Darwin that he had allowed his aste for music and poetry to atrophy could o-day be made by many intellectual spe- ialists. Good music is especially healthful.

The exercise of the will is of first im- portance. Many young people to-day are rought up so well protected that they have ost the power to decide for themselves. Vill is exercised every time a decision is nade. One of the advantages of all games s that they require decision by the players.

A game like baseball calls out the exercise of almost every power. It requires the mind to play, the emotions to enjoy, the will to decide, the muscles to act, and all in mutual coordination.

The Avocation

Since the work of most people is likely to produce some unhygienic element which can not be avoided, a compensation should be sought in an avocation or "hobby," to be practised out of regular working hours. The avocation should be far removed from the nature of the regular work. Often the avocation can serve a productive purpose. Gladstone and Horace Greeley sawed wood or chopped down trees for recreation. A well-known engineer divided his recreation between writing stories and painting pictures.

Enjoy Recreation

But one should beware of turning his play itself into work. Some people read Shakespeare to "improve their minds," and make as hard work of it as tho they were studying geometry. We should enjoy our recreations for their own sake, or else they are not recreations. All work and no play make not only dull boys but dull men and women.

Pleasures of Walking

In some form, every one can secure recreation. If one can not play golf, or polo, or tennis, or swim, or climb the Alps, at least he can walk, and, if he tries, he can do

o in good company on interesting highways and byways.

Games

Recreations in which more persons than one take part are far superior in this respect to those of a solitary nature. They require a give and take, a matching of wits, a feeling of rivalry, and at the same time, companionship.

Plays and moving pictures of the right character and free from morbid suggestions, if enjoyed in moderation, are hygienic. Comedy is generally more wholesome than tragedy. Laughter and success lengthen life; grief and failure shorten it.

The proper kind of reading is often a most beneficial type of recreation.

Morbid Literature

It is best for the average individual to avoid literature that deals with the morbid and pathological, that depicts and analyzes abnormal psychological conditions. Such studies are better left for alienists. Literature of mawkish sentimentality should also be avoided. Within the range of sound literature there is a wide choice of abundant material affording healthful mental suggestions.

Dancing

Some forms of dancing combine wholesome exercise, social enjoyment, and the acquirement of skill and grace, but it is

seldom of much hygienic value because danc ing is so frequently overdone, and often in volves bad air and loss of sleep. In on large plant where the employees were ex amined by the Life Extension Institute, th management regarded the harmful effect o dancing as their chief obstacle to efficiency Many of the large force of girls and wome were accustomed to dance until late in th night, bringing on a condition of chroni fatigue.

Card-playing

Card-playing and similar games affor wholesome mental recreation for some per sons. However, they, too, are liable to b associated with late hours and other disad vantages even when they do not degenerat into gambling. In short, card-playing, danc ing, and many other popular forms o amusement often go over the border of rec reation and become dissipation.

Suicidal Amusements

Amusements which weaken and degrad are not hygienic. Many who need amuse ment make the fatal mistake of getting i in suicidal ways, in the saloons, dives, an the low dance-halls.

Play is simply a half-way stage betwee work and rest. In a hygienic life there mus be a certain amount of actual rest. Ever bodily power requires rest after exertio

The heart rests between beats. The muscles require relaxation after every contraction. The man who is always tense in muscle and nerve is wearing himself out.

Relaxation

The power to relax, when fatigue requires it, is one of the most important safeguards one can possess. Lying down when tired is a good rule. A very hard-working college president when asked about the secret of his working-power and length of life replied, "My secret is that I never ran when I could walk, never walked when I could stand, never stood when I could sit, and never sat when I could lie down."

A Rule for the Lazy

Such rules as these are valuable, of course, only when the requirements of one's occupation tend toward ceaseless activity. For idle and lazy people the rule should be reversed—never to lie down when one could sit, never to sit when one could stand, never to stand when one could walk, and never to walk when one could run! A complete life must have all in due proportion. Relaxation is only a short vacation, as it were, between two activities.

Bathing and Swimming

Bathing and swimming supply, in their numerous forms, examples of both healthful activity and relaxation. A cold spray or shower, alternated with hot, affords excel-

lent gymnastics for the skin. A very hot bath, lasting only a minute, or even a hot foot-bath, is restful in cases of general fatigue. The most restful of all is a neutral, that is, tepid, bath of about the body-heat (beginning at 97 or 98 degrees and not allowed to drop more than 5 degrees and continued as long as convenient).

How to Induce Sleep

The wonderful nervous relaxation induced by neutral baths is an excellent substitute for sleep in case of sleeplessness, and often induces sleep as well. Neutral baths are now used not only in cases of insomnia and extreme nervous irritability, but also in cases of acute mania. When sleep occurs in a neutral bath, it is particularly restful. A physician who often sleeps in the bath-tub expresses this fact by saying that "he sleeps faster" there than in bed.

Sleep may also be induced by monotonous sound, or lack of sound, or the monotonous holding of the attention. Keeping awake is due to continued change and interruption or arrest of the attention.

Exercise taken in the afternoon will often promote sleep at night in those who find sleep difficult. Slow, deep, rhythmic breathing is useful when wakeful, partly as a sub-

stitute for sleep, partly as an inducer of sleep.

Sleep is Nature's great rejuvenator, and the health-seeker should avail himself of it to the full. Our sleep should not only be sufficient in duration but also in intensity, and should be regular.

Hours of Sleep

The number of hours of sleep generally needed varies with circumstances. The average is seven to nine. In general one should sleep when sleepy and not try to sleep more. Growing children require more sleep than grown-ups. Parents often foolishly sacrifice their children's sleep by compelling them to rise early for farm "chores," or in order to sell papers, or for other "useful" purposes.

Eating Before Retiring

One's best sleep is with the stomach practically empty. It is true that food puts one to sleep at first, by diverting blood from the head; but it disturbs sleep later. Water, unless it induces bladder-action during the night, or even fruit, may be taken without injury before retiring. If one goes to bed with an empty stomach, he can often get along well with six or seven hours' sleep, but if he goes to bed soon after a hearty meal, he usually needs from eight to ten hours' sleep.

Place of Sleep

It has already been pointed out that sleeping outdoors is more restful than sleeping indoors.

Pillows

Pillows, when used, should be proportioned to the dimensions of the sleeper. A small shoulder requires a small pillow. The head should lie flat, not inclined on the pillow.

A pillow is not a necessity if one sleeps lying prone with one arm extended above the head and one leg drawn up. This sleeping attitude can easily be reversed to the opposite side. It has one advantage over pillow-sleeping, that of not tending to round shoulders. This prone position is often used now for infants, but is seldom enjoyed by adults.

Type of Bed

A modern "hard" bed is far preferable to the old-fashioned soft (and hot) feather bed.

Character of Thoughts

The character of sleep depends largely on the mental attitude on going to bed. One should get into the habit of absolutely dropping work and cares at bedtime. If then one suggests to himself the pleasantest thought which memory or imagination can conjure up, his sleep is likely to be far more peaceful and restful than if he takes his worries to bed, to keep him awake until sleep comes in spite of them, and to continue to plague

im in his dreams. If one is worried, it is a ood plan to read something diverting, but ot exciting, just before retiring. Often bstruse books that require great mental oncentration will prove serviceable in quiet-ng the mind and inducing sleep.

Section II—Serenity and Poise

As we have seen, not only the body but he mind needs its due activity and rest. As o the mind, the important question is the uality of the activity rather than the quan-ity. If we are to be really healthy, our nental attitude must be healthy. A healthy nental attitude implies many elements, but they are all roughly summed up in the word "serenity." Probably no other one hygienic requirement is of greater importance than this. Moreover, the attitude of "healthy-mindedness" should be striven for not only in order to produce health, but as an end in itself, for which, in fact, even health itself is properly sought. In short, the health of the body and the health of the mind act and react on each other.

Influence of Health on the Character

We may generally keep serene through following the other measures already described. Discontent is undoubtedly very often the consequence of wrong conditions

in the body, and tho melancholy, worry, peevishness, fear generally appear as arising from outward conditions, there are usually real physical sources, existing within the body itself. These are at times most difficult of recognition. A person who is physically ill is likely to be ill-satisfied with everything, without suspecting the fundamental cause of the discontent. When the apparent "cause" is removed, the discontent remains none the less, and fastens itself on the next thing that comes along.

The "Cause"

Altho some little event such as the mistake of a tradesman or a cross word of a friend may seemingly "cause" a disagreeable reaction in a man if he is ill (whether he knows he is or not), the same "cause" does not necessarily produce that same reaction at all times. When he is in a healthy mood, the "cause" may be entirely inadequate to bring about the same result.

Approach of Menstrual Period

The near approach to the menstrual period in women is often accompanied by mental depression and physical fatigue which it is almost impossible for the sufferer to recognize at the time as caused by anything but "real" or outside misfortunes.

Other physical conditions act in the same way. The hidden cause may be constipation,

Hidden Causes

ye-strain, or the effects of alcohol or other lrugs, a sedentary life, a bad posture, or veak abdominal muscles; and the proper emedy may be an enema, a pair of glasses, vigorous swim, deep breathing exercises or n abdominal supporter, an erect carriage or general change of daily habits. A young nan returning from a surveying trip in the nountains of Colorado in which an ideal ygienic out-of-door life was lived, said, "I ever saw so good-natured a crowd of rough nen. Nothing ever seemed to make them ngry. They were too full of exultant ealth."

Mental Rewards from Health

Health for the body awakens mental apacities where they exist. Failure in menal work can often be traced to failure in hysical health; and the restoration of odily health is often essential to success in he tasks of the mind. This is especially rue of the artistic professions, where the ind of product is dependent so largely upon he state of the emotions, upon exhilaration nd enthusiasm. A noted sculptor who, a umber of years ago, was "down and out" n the artistic world, after a period of years "came back" with a masterpiece, having dopted a more hygienic life.

Epictetus taught that no one could be the

highest type of philosopher unless in exuberant health. Expressions of Emerson's and Walt Whitman's show how much their spiritual exaltation was bound up with their health conditions and ideals. "Give me health and a day," said Emerson, "and I will make the pomp of emperors ridiculous."

Influence of the Mind on Health

But what most concerns us in this section is the converse proposition, namely, that the condition of the mind has an important influence over the condition of the body. A Kansas poultryman, who owns a hen which he claims to value at $10,000 because of her qualities as a breeder, a few years ago knew a great deal more about how to maintain the health of his poultry than he did about how to maintain his own health. Long and bitter experience had taught him that he obtained freedom from sickness among hens only by being very careful to feed them on a special diet; to give them drinking water at regular intervals—warmed in winter; to supply them with well ventilated and clean houses and so on. But, after all this, he found there was one condition, which, if unfulfilled still precluded the realization of maximum possibilities. "A discontented hen won't lay eggs," was the startling discovery. "When I see a man go into the yard and

'holler' loudly at the hens, and wave his arms, making them scatter, frightened, in all directions, I say to that man: 'You call at the office and get your pay and go.' But when I see a man go into the yard, and call gently to the hens, so that they all gather around him and coo and cluck and eat out of his hand, I raise that man's pay.''

Physical Manifestations

It can not be too much emphasized that mental perturbation affects the body in many ways. Shame fills our cheeks with blood. Fear drives the blood away. Excitement quickens the heart-beat. Grief brings tears, the reaction of glands about the eyes. Sighs cause disturbances of regular breathing. A great shock to the mind may cause fainting, the rush of blood from the head into the abdomen. Worry will interfere with digestion and sleep. The *X*-ray has detected the arrest of the peristaltic movement of the stomach and intestines because of a strong emotion. Some peculiarly constituted people, who take their work and obligations with a kind of seriousness that amounts almost to fear, can not eat anything of consequence until their day's work is ended. The digestive processes seem to be at a standstill until then. A curious fact is that strong emotion may lead to a great increase

in the sugar in the blood, sometimes enough to cause its appearance in the urine as tho the person had diabetes. One man expresses this by saying, "bitterness of soul banishes sweetness even from the body."

Cannon, Crile and others have claimed that pain, hunger, anger and fear influence the secretion of the adrenal glands above the kidneys, causing the release of sugar in the blood and the experience of fatigue. This, however, is disputed by others.

The Demands of the Mind

It is doubtless on account of such influences of the mind on the body that some persons who have attempted to improve their health by what they call "thoroughly masticating" their food—but who have interpreted this phrase as having a purely mechanical meaning—have wondered why they were not benefited when they forcibly held their food in their mouths until they performed a certain number of chews, while in fact they were making a bore of eating and were forgetting to taste and enjoy. The mind and the emotions refuse to be ignored in this way, and exact due penalty from the body when they are not satisfied. To attain the desired results from any hygienic measure, it is necessary, in some degree at least to satisfy the mind along with the body.

There is in fact a danger to which some eople are especially subject—the danger of ecoming hypochondriacs from paying too 1uch attention to physical hygiene. Such person becomes fearful lest he is not doing xactly the right thing. He looks susiciously at every article of food and fears 1at it will disagree. He fears that he has rained his heart; he worries over the loss an hour's sleep; he chafes because his emoyer has not given him a vacation at the ght time or of the right length. The hypoiondriac thus neutralizes practically all the nefit of other hygienic measures by disrerding the special measure of keeping rene. It might, in many cases, be better to sregard some rules of hygiene than to orry over them.

Hypochondriacs

On this theory carried to an extreme the votees of mind-cure cults have derided ery hygienic measure but one—their nind-cure." They sometimes suceeed in e "real cure of imaginary ailments," and e "imaginary cure of real ailments." In e latter case, the mental contentment lasts ly until the real ailment becomes too agessive to be ignored. But it is a great stake to stake everything on the simple source of mental equanimity. In some

"Mind-cure"

cases it is criminal, as, for instance, to re-fuse surgery for cancer, or outdoor livin for tuberculosis.

In its proper place, "mind-cure" is an es-sential part of individual hygiene. In orde to get the benefit of the other rules, ther must be no worrying or watching of symp-toms. After the regimen of exercise, bath diet, etc., has been selected, it must b followed as a matter of course, with conf-dence that it will help, and with patienc as to the rate of improvement which wi follow.

Worry

It would seem that incessant, even if mil worry is more exhausting than occasiona fits of intense anger or fright or ove excitement, just as we waste more wat from a spigot left slightly open all the tim than from one which is alternately wide ope and shut. Worry, if unceasing, will ofte drain away the largest store of nervou energy. Worry seems, as it were, to shor circuit nerve currents in the brain, whic normally form a long circuit through th body. One man, with this simile befo him, has found he can stop worrying almo at will, avoid the supposed continuous sho circuit and save up his nervous energy un it is needed.

Rejoice at Things as They Are

We must rejoice at things as they are; hey might be worse! If we should count up ve should be surprized to find how seldom he things we fear or worry about really iappen. It is a true proverb that "half the rouble never comes."

Serenity an Art

Each must learn for himself how best to void anger, fear, worry, excitement, hate, nvy, jealousy, grief, and all depressing or bnormal mental states. To do so is an art hich must be practised, like skating or icycle-riding. It can not be imparted ierely by reading about it.

"One Day at a Time"

When, as unfortunately is often the case, he difficulty of maintaining one's serenity eems insuperable, the battle can often be on by "living one day at a time." Al-iost any one in ordinary conditions of ad-ersity has it within his or her power, for ierely one day or at any rate one hour, or ne minute, to eliminate the fear, worry, nger, or other unwholesome emotions amoring to take possession. At the ex-iration of say the hour, or minute, the same ower can be exercised for the next en-iing period, and so on until one is caught apping, after which he must pick himself p and patiently try again.

The Hurry Habit

In modern life, which has been gradually speeded to the breaking-point, many people are suffering from a constant oppressive sense of hurry. Most people have "so much to do," that they can not do it. This fact is of much annoyance and at the same time spurs them on in the vain endeavor to catch up. When once it is realized that the sense of hurry actually reduces the effective speed of work—in other words, that "the more haste, the less speed"—the situation has been reached in which the individual can teach himself some practical philosophy.

Religion and Philosophy

An immense help in the field of mental hygiene is to be obtained from religion and philosophy, altho this is not the place to advocate any particular form of either, and from the standpoint of hygiene, it does not greatly matter! One may get his chief help from the Bible, from faith-healing cults, from writers like Emerson, from Tagore and other Orientals, or from Marcus Aurelius and Epictetus.

"Religion of Healthy-mindedness"

Professor William James commends the adoption of a "religion of healthy-mindedness" in which we renounce all wrong or diseased mental states, cultivating only the healthy ones, such as courage, patience, optimism, and reverence.

When the mind turns from shadow to sun-hine, the body also will tend to assume the adiance of health. Stevenson said that there s no duty we so much underrate as the duty f being happy. The habit of being happy nables one to be freed, or largely freed, rom the domination of outward conditions. 'ho the trait is apparently totally lacking in ome, while existing to a high degree in thers, experience has shown that conscious ultivation will develop it to an appreciable egree, even in very stubborn cases. As in ittle Pollyanna's "Glad Game," it is ossible to find something to be glad about n every situation in life.

The Habit of Happiness

Repression is injurious. All the rea-ons in favor of fear or worry should be iven their day in court. If these facts re not faced, if repression alone is ractised, represt ideas may return with einforcements, but, on the other hand, f these facts receive a fair hearing, horough analysis and ultimate rejection, hey can, so to speak, have nothing more to ay.

The secret of equanimity consists not so uch in repressing the fear or worry, as in *ropping* or ignoring it—that is, diverting nd controlling the attention. It does no

Control of Attention

good to carry a mental burden. "Forget it!" The main art of mental hygiene consists in the control of attention. Perhaps the worst defect in the Occidental philosophy of life is the failure to learn this control. The Oriental is superior in such self-training. The exceptional man in Western civilization who learns this control can do the most work and carry the most responsibility. On much the same principle as the Indians used when their young men were trained to endure pain self-inflicted, we might well devote a few minutes each day to the difficult task of changing at will our attention from the thing which is engrossing it to anything else we choose; or, what is more difficult still, to blank nothingness. When we have sufficiently strengthened this power, we can turn off the current of our thoughts as we turn off the lights and lie down to sleep in peace, as a trained sailor does in a storm.

Making Up One's Mind

If a person's work is drudgery but has to be endured, the making up of the mind to endure it cheerfully, the relinquishment of the doubtful but fascinating pleasure of dwelling upon one's misery, is found to largely obviate the burden. It is the making up of the mind which presents the difficulty. The truth is that we instinctively

hrink from making, *without reservation,* mportant decisions as to our future course of conduct. We balk even at really comnitting ourselves not to worry. A man who, vhen he complained of his lot, was advised o "grin and bear it," replied that he'd have o bear it, but he'd be hanged if he'd grin!

Intensity of Desires

The decision which is perhaps the hardest o make and, at the same time, the most imoortant from the standpoint of health and vorking-power, is the decision *not to care oo much* about the objects we are seeking o achieve. We need not go so far as to subcribe to the Nirvana philosophy; a certain ntensity of desire is normal. But modern ife tends to a morbid frenzied intensity. Most of us need, in the interest of mental ealth or sanity, to moderate our desires. A usiness man who had set his heart on fulilling a large responsibility nearly wrecked is health from worry over the outcome. Iis wise physician prescribed that, before itting down to his desk each day, he should pend five minutes repeating and impressing n his mind the words, "I don't give a ang! I don't give a hang!" The truth is hat many people fail because of overnxiety lest they fail. Some invalids die rom an exaggerated desire not to die.

The very core of mental hygiene is de-cision. Indecision or half-heartedness mean a mind warring with itself and wasting it energies in internal friction. After a reason-able period of debating pros and con the decision should be made so fully an unreservedly that even that great myster-ious part of us, our "unconscious mind," i fully committed. The truth is we seldon use all our reserve power. Usually we allo part of our mind to hold back. He who learn to make every decision a clear-cut, whole-hearted decision adds enormously to hi mental health and effectiveness.

The force of habit is much stronger tha most people realize, and makes it difficult especially at first, to effect a change. Late as partial successes become more frequent the benefit of habit is gradually transferre to the other side, becoming a help instead o a hindrance.

Ruling Ourselves

A helpful precept, when one is failing i some crucial undertaking from his ver over-anxiety to succeed, is to replace th ambition to succeed by a determination t pass the crisis unruffled, whether one suc-ceeds or fails, "He that ruleth himself i greater than he that taketh a city," and in-cidentally if we rule ourselves we are fa

more likely than otherwise to take the city, if that be possible at all.

An ideal course of conduct implies a constant readiness, after all has been done which can be done, to renounce one's feverish desires and accept whatever higher powers decree, even if it be death. This is one of the supreme aims of every great philosophy or religion. Job said, "Tho He slay me, yet will I put my trust in Him," and Christ exclaimed, "If it be possible let this cup pass from me; nevertheless, not as I will, but as Thou wilt."

CHAPTER V

HYGIENE IN GENERAL

Section I—The Sixteen Rules of Hygiene

The aids to health discust in the preceding chapters may be summarized in specific formulas classified under the four heads, Air, Food, Poisons, and Activity, corresponding to the four chapters, and under sixteen subheads, corresponding to the sixteen sections.

I. Air.

1. Ventilate every room you occupy.
2. Wear light, loose and porous clothes.
3. Seek out-of-door occupations and recreations.
4. Sleep out, if you can.
5. Breathe deeply.

II. Food.

6. Avoid overeating and overweight.
7. Eat sparingly of meats and eggs.
8. Eat some hard, some bulky, some raw foods.

9. Eat slowly.
10. Use sufficient water internally and externally.

[I. Poisons.

11. Eliminate thoroughly, regularly and frequently.
12. Stand, sit and walk erect.
13. Do not allow poisons and infections to enter the body.
14. Keep the teeth, gums and tongue clean.

V. Activity.

15. Work, play, rest and sleep in moderation.
16. Keep serene and whole-hearted.

The application of these rules to one's aily life must be varied with each indiidual. The most practical method is for ıe individual to begin the improvement he 'ould seek by constructing a typical day's rogram in which time is provided for, say, reathing and other exercises in bed, bath, ›ilet, walk to business, meals, amusements, ;c., with special notes and memoranda as to ıe particular faults of omission and comıission to be corrected. One might also, as 'enjamin Franklin records in his autobigraphy, keep a daily record for a week as

to how nearly the program is lived up to. By dint of such and other stimuli, the transition in habits can be made, after which the "rules" cease to be rules, as carrying any sense of restriction, and become automatic like putting on or taking off one's clothes.

Section II—The Unity of Hygiene

The Rules Interrelated

The above rules embody our preachment on individual hygiene. We have stated them as sixteen separate kinds of procedure. In actual life, however, our acts can not be so separated. The neglect or observance of one rule carries with it, to some extent, the neglect or observance of other rules. For instance, one can not take muscular exercise without, to some extent, taking breathing exercises. Swimming serves as a means of cleanliness, of skin gymnastics, of general exercise, and of amusement. A game of tennis implies the practise, to some extent, of at least five of the sixteen rules.

The human body is a "harp of a thousand strings," which are intended to harmonize. If one of them is out of tune, it is likely to cause discord throughout, while to tune up one helps the harmony of all.

Any one ailment has a far-reaching effect throughout the system. It is because of

Medical Specialists

his far-reaching effect that the "one idea" pecialist in medicine has so often thought is particular specialty to be the one and nly gateway to all therapeutics and hygiene. 'he oculist is liable to look at all ailments s related to the eyes; the dentist as related ɔ the teeth; the mental hygienist as related ɔ wrong habits or attitudes of mind. If we xamine their claims, we find that they are sually right in their affirmations, tho wrong ı their denials. It is their affirmations in 'hich we are here interested. They find that ıe ailments within their own special province ktend in unsuspected ways, and to a surpriz-ıg degree into seemingly remote fields; and ıat to remedy the special defect which they ın treat, will often go a long way toward ɜmedying numerous other ailments.

Remote Effects of Ailments

It has already been noted that eye-strain ads to an astonishing number of serious ɜrvous affections, and that corrective eye-lasses will often work wonders for remedy-ıg those ailments and improving the gen-ral health. There may be other unhygienic ɔnditions equally responsible for these mptoms, and the correction of which may roduce equally wonderful improvement. ertigo may be due to eye-strain, or it may be ıe to wrong posture or to pressure of wax

on the ear-drum. Diabetes may be aggravated by too much sugar, by infected tooth-sockets, or by too much worry. Tuberculosis may be due jointly to indoor-living, lack of exercise, wrong diet, wrong posture, sexual excess, alcohol, nerve-strain, and numerous other preconditions, beside infection with the tubercle bacillus. The social evil can be fought not only directly by attack on prostitution, and by appeals to self-control and moral ideals, but also indirectly by diminishing the consumption of alcohol and other drugs, for alcohol not only produces abnormal sexual desire but reduces the strength of will by which sexual desire is re-prest. Forel asserts that the social evil can not be controlled until the use of alcohol as a beverage is abolished.

As already stated the low sickness rate from venereal disease in our army is largely due to the restrictions as to alcohol and the elimination of the saloons from the imme-diate vicinity of camps, and provision for wholesome recreation.

Popular Delusions

It is not uncommon for people to at-tribute their ailments to the less importan rather than the more important cause, and so fail to get the best benefits of hygiene Many people bemoan the fact that they sa

n a draft and "therefore" caught cold, when what they most needed was not to keep out of drafts but to keep in such condition that drafts would do them good, not harm. Benjamin Franklin, a century ago, believed, what we now know to be true, 'that people who live in the forest, in open barns, or with open windows, do not catch cold, and that the disease called 'a cold' is generally caused by impure air, lack of exercise, or overeating."

So-called "Overwork"

Most people who are "overworked" are, more properly speaking, simply the victims of bad air, bad diet, poisons, or worry. They believe that because they are tired it must be work which is hurting them. The man who breaks down in middle life commonly imagines that he has ruined his health by overwork. The college girl thinks she has ruined her health by study. All these "overworked" people seek to prove their case by showing that they improve in health when given a vacation. This simply shows that a bad condition can often be remedied by improving the general health in any way whatever, even if the primary source of the difficulty is not reached. They are undoubtedly working beyond their working capacity; but their working capacity is only

a fraction of what it would be if they took exercise, were not constipated, did not eat too much, abjured alcohol, or ceased to worry continually. If they lived hygienically in these respects, the work which was a drag might be an inspiration. A physician of wide experience says that every day men come to him broken down in health, invariably telling him that they have overworked; and yet upon questioning them he finds that none of them works as hard as he. Their breakdown was due to the terrible load of unphysiological habits which they had been carrying—a load so great that scarcely any work could be carried in addition.

An All-round Regime

Other examples might be given of ascribing ailments and disabilities to the less important instead of the more important causes. The error is almost always made of resting the blame on only one cause. In consequence most health-seekers fall into the error of making only one correction in their daily *régime* of life. One ceases alcohol drinking, another gives up tobacco smoking, another gives up coffee, a third ceases using all "red meats," another turns vegetarian, another adopts a raw food diet, another takes up outdoor sleeping, another adopts a

laily game of golf, another embraces a nental healing cult another takes up thorough mastication. But great and permanent results require the adoption of an all-round, well-balanced *régime*.

Section III—The Obstacles to Hygiene

Effort of the Will

It is not enough that the individual should now how to live. Knowledge is of no avail without practise. Mr. Moody, the evangelist, nce said of religious conversion, "Merely to now is not to be converted. I once boarded train going in the wrong direction. Some ne told me my mistake. I then had knowledge, but I did not have 'conversion' until I cted on that knowledge—seized my traveling-bag, got off that train, and boarded one oing in the opposite direction." Many peole are on the wrong train in hygiene, as in eligion, and know it. They are traveling ast to that kind of perdition which in the nd unhygienic living always brings. In fact, great many people practise unhygienic abits more through indifference than hrough ignorance. Most people have acuired, by imitation of their neighbors, a reat number of unhygienic habits and have ontinued in these habits for so many years hat they can not get rid of them, except

through a great effort of will. This effort they are usually unable or unwilling to put forth unless very strong incentives are brought to bear. Often—in fact, if the truth were known, usually—they wait until ill health supplies the incentive. The man who is most receptive on the subject of health conservation is, in the majority of cases, the man who has just had some ominous warning of coming ill health; altho there is now a small but increasing number who do not wait so long, men who pride themselves on keeping "in the pink of condition." These are the men who are rewarded for their efforts by enjoying the highest reaches of working-power.

Cost of Good Health

The ordinary man, in ordinary good health, does not want or thinks he does not want to live hygienically. He sees all sorts of imaginary objections to adopting a hygienic life, and closes his eyes to its real and great advantages. One of the objections often trumped up is that the practise of hygiene costs too much—that it can only be a luxury of the rich. It is quite true that here, as elsewhere in human life, wealth confers great advantages. The death-rate among the rich is always less than that among the poor. And yet the rich have un-

ygienic temptations of their own, while he poor, on their part, are far from living p to their opportunities.

There are really only two material disadvantages from which the poor suffer in their pportunities to live a healthy life: One is nhygienic housing, both at home and at vork; the other is unhygienic toil. It must e admitted that millions of unfortunates re unable individually to remedy these two lisadvantages in their lot in life. Yet they an, even in these two respects, accomplish nuch if they take an intelligent interest in ygiene. The graduates of tuberculosis anatoria are largely among the poor and hey are doing much good missionary work n securing better ventilation, both in the ome and in the work-room. They find this ossible partly by insisting on more open windows in home and workshops, partly by changng their homes for others better equipped vith windows and perhaps sleeping-porches, r situated in the suburbs instead of in the ity, partly by changing their occupations, artly by getting the cooperation of their mployer or simply by cooperating with him vhen he is ready to do his part. The worknan can also accomplish something through he trades unions, especially in regard to

Missionaries

hours of work. Employers will increasingly cooperate in this movement, as they come to realize that the securing of efficiency in their workmen is to their interest, and that monotony, toil so impersonal as to be uninteresting, long hours, and other unhygienic elements which are now, through sheer carelessness, often imposed on their workmen, reduce, in the end, their own financial profit.

Except for the evils mentioned—those of housing and working conditions—there are few people so poor that they can not buy the means of living a healthy life. In fact, hygiene is one of the few precious gifts which can be had almost for the asking. Most people can sleep out-of-doors, if they will—if in no other way than by the so-called indoor window-tent—or can take deep-breathing exercises without cost. It costs nothing to stand, sit, and walk erect, to evacuate thoroughly, regularly, and frequently. It costs less than nothing to avoid overeating and overweight, and to be totally abstinent from alcohol and tobacco.

Cost of Food

Almost all can allow enough time for meals to eat slowly. Coarse and raw foods are always to be had and are usually cheaper than the conventional soft, concentrated, cooked foods. In fact, meat, eggs, and

ike foods are among the most expensive and he least desirable. If we compare the cost of flour and of the other cheapest food maerials with the cost of oysters, one of the learest, we find that the latter is fifty times is expensive as the former for the same ood value. This takes no account, of course, of the expenses involved in cooking either of hem. It has been proved by actual experience that one can live in the best of health on food costing as low as thirty-five ents a day, exclusive of the labor of preparing, cooking and serving. This is possible nywhere in America within fifty miles of a ailroad. The only real objection to living on his minimum expense is the lack of variety. The following is a brief list of foods in scending order of cost per 100 calories of ood value, the cheapest being at the beinning and the dearest at the end: glucose, orn-meal, wheat-flour, oatmeal, cane-sugar, alt pork, rice, wheat bread, oleomargarine, eans, peas, potatoes, butter, milk, cheese, eef-stew, ham, mutton-chops, beef, eggs, nd oysters. If the foods in this list be ooked up, in the table given in the Supplementary Notes, for their protein, fat, and arbohydrate contents, it will be seen that well-balanced ration is possible without the

Food Costs

use of expensive foods. In fact, among the cheap foods are some consisting mostly of protein, some consisting mostly of fat, and some consisting mostly of carbohydrate. For instance, cheap sources of protein are skim milk, beans, cheese, and peanuts. Cheap sources of fat are oleomargarine and cotton-seed-oil. Cheap sources of carbohydrate, *i.e.*, starch and sugar, are bread, bananas, potatoes, rice, glucose, and even ordinary sugar. If a diet selected for cheapness is not at first well balanced, a judicious ad-mixture of one or more of the foods just mentioned will restore equilibrium.

Repaid Cost

Thus, most of the rules of hygiene cost nothing to observe. Even when hygiene is costly at first, the cost is usually repaid in the end many times over. To sleep out-of-doors costs some extra blankets, bedding, clothing, and roll curtains, but these not only save the cost of heating an indoor sleeping-room, but save also the cost of ill health. There is no better economy than to keep one's working-power. To lose it means to lose its earnings and to have, in addition, the heavy expenses of medical attendance, medicines, and nursing, and often to lose life itself with its potential earnings of every sort. In short, an unhygienic life, for

the sake of economy, is "penny-wise and pound-foolish."

"I Have No Time"

Many busy men object to hygiene because, they say, they have no time for it. They imagine that to devote an hour each day to exercise or relaxation is a waste of time and that they are really economizing their time by working that hour instead. We are here referring, not to those who can not control their working-time, but to those who deliberately choose to work when hygiene would require them to play. It is often those who fix their own working-hours, rather than those whose working-hours are fixt for them, who overwork the most. If these could know the suffering which sooner or later follows inevitably as the consequence of this mistaken policy, they would not pursue it for a single day. A slight loss of working-power comes immediately. A careful observer of mental workers found that an hour invested in exercise in the afternoon often pays for itself within a day, by rendering possible more rapid work. He also found an improvement in the quality of his work. The razor-edge of the mind needs daily honing through physical exercise. The same principle applies to all work. It is just as necessary to stop, at intervals, our

physical and mental machinery for oiling and repairs as to stop the machinery of a factory.

"Too Much Trouble"

Another objection is that the practise of hygiene is "too much trouble." It is undoubtedly true that no one who has unhygienic habits can overcome them without a certain amount of "trouble." The people who get the best results are those who are never deterred by trouble so long as the trouble is worth while. For those who have not the necessary enthusiasm or self-control to break their unwholesome habits by sheer will power, the best advice is so to arrange their lives as to make the practise of hygiene inevitable. One physician in Chicago deliberately got rid of his automobile and other means of locomotion in order to force himself to walk to all his patients, and so secure enough physical exercise. Another man in New York City, with the same object in view, selected the location for his dwelling so that there was no rapid transportation available to take him to his office, making the walking back and forth a necessity from which he could not escape.

Simplicity of Hygienic Living

The only difficulty lies in overcoming the inertia of acquired habits. After one has changed his habits, it is just as easy to live

ghtly as to live wrongly. The rules of hy-
.ene are not restrictive, but liberating.
hey may seem at first restrictive, for they
rohibit many things which we have been in
ıe habit of doing; but they are really liber-
ing, for the things we were doing were un-
alized restrictions on our own power to
ork, to be useful, or even to enjoy life.
he "rules" of hygiene are thus simply the
eans of emancipating us from our real
nitations. These so-called rules, when
ied, will prove to be not artificial but
ıtural, not difficult but easy, not compli-
ıted but simple. They are almost as simple
the direction to bathe in the river Jordan.
is, in fact, their very simplicity and avail-
ility to which is largely due their deplor-
ble neglect and the failure to realize the
onderful benefits following their careful
ıd continued observance.

The Evil of Romancing

Not only a healthy mental attitude toward
e, but a healthy mental attitude toward
ıe's own unhygienic habits is essential. It
a very common thing for a man to ro-
ance over his shortcomings, or his un-
ealthy physical conditions, to make humor
them to his friends. Very often the first
ep toward a better physical condition is a
ıange in this mental attitude.

Section IV—The Possibilities of Hygiene

There never was a time when the possibilities of hygiene could be more clearly visualized. The tremendous world struggle which has just culminated, so far as its military phases are concerned, has revealed many of the underlying deficiencies of our civilization, especially with regard to personal hygiene and the physical care and development of the body. As we view the tremendous possibilities of disease and its actual ravages in the war-stricken countries we realize how important it is not only to prevent future wars but to prevent future disease and physical deficiency. We shall sadly miss the opportunities of the hour if we do not gain freedom from physical ills as well as from political ills.

The Preventability of Disease and Death

Certain it is that more people would practise hygiene if they could be made to realize in some vivid way how much they need it. Few persons, even when they read and accept the statistics on the subject, really have a picture of the imperative need of hygiene as an integral part of every human life. It is not brought home to them how widespread is illness, how numerous are preventable deaths, how many are the tendencies toward individual and racial deterioration.

The report of the Roosevelt Conservation ommission on National Vitality indicates at annually there are in the United States 'er 600,000 deaths which might be prented if existing knowledge of hygiene ere properly applied; that at least half of e 3,000,000 and more sick-beds constantly pt filled in the United States are unnecesry; that the financial loss from earnings t off by preventable disease and premature ath amounts to over $1,500,000,000 anıally; and that over 15 years are lost to e average life through the lack of application of knowledge which already exists but iich simply has not yet been disseminated d applied.

Since that report (on National Vitality) as written in 1908, over a quarter of the provement then indicated as possible has en actually achieved.

One of the most striking proofs of the lossal life-saving possible is afforded by e statistics of deaths in our army camps. therto the lowest reported death-rate in my camps of other nations has been 15 r 1,000. In our cantonments the rate when st recorded was about 9 per 1,000, from iich it has gradually sunk until, just prior the epidemic of Spanish influenza, it

reached 2½ per 1,000. Our army health ex
perts believe that it can be still further re
duced by controlling coughing, sneezing
spitting, and shaking hands.

Impairments Unsuspected

The health examinations of the Life Ex
tension Institute have revealed unsuspecte
ailments in persons who considered them
selves well, and to an extent which ha
astonished even those who have long bee
familiar with these subjects. Among larg
groups of clerks and employees of banks an
commercial houses in New York City wit
an average age of 27, and all supposedl
picked men and women, none were foun
free of impairment or of habits of livin
inviting impairment. Of those with im
portant physical impairments, 89 per cen
were, prior to the examination, unaware o
impairment; 16 per cent. of the total num
ber examined were affected with organi
heart trouble; 42 per cent. with arteria
changes, ranging from slight thickening t
advanced arteriosclerosis; 26 per cent. wit
high or low blood pressure; 40 per cen
showed urinary impairment (casts, suga
etc.); 24 per cent had a combination o
urinary and other important impairment; 4
per cent. had decayed teeth or infected gums
31 per cent. had faulty vision uncorrected.

That these figures were not derived from hypercritical consideration of these sub-ɛts is shown by the figures from the first aft. About one-third of the men be-een 21 and 31 were found unfit for the ıining camps, altho many were accepted th gonorrhea and syphilis, and subse-ently treated at the camps. The inclusion these and other individuals showing im-irments that were also treated at the mps would greatly increase this percent-e. The lesson from these figures is that ysical examination of even the young and parently vigorous should occur not once a century, when war compels it, but an-ally as advocated by the Life Extension stitute and provided for in its services.

Minor Ailments

There are few persons in America to-day o reach the age of forty sound and normal every part of the body, especially if we lude among abnormalities the minor ail-nts. The extent to which minor ills are evalent among those who pass for "well" ople is not generally appreciated. Once we ıetrate beneath conventional acquaint-e we almost invariably learn of some ıctional trouble, such as impairment of ırt, circulation, liver, kidneys, stomach; gallstones, constipation, diarrhea; or in-

somnia, neurasthenia, neuritis, neuralgi
sick-headache; or tonsillitis, bronchitis, ha
fever, catarrh, grippe, colds, sore throat; o
rupture, enlarged glands, skin eruptions; o
rheumatism, lumbago, gout, obesity; or de
cayed teeth, baldness, deafness, eye ailment
spinal curvature, flat foot, lameness; o
sundry other "troubles."

These ailments, tho regarded as "minor,
should be recognized promptly and accepte
as the signal that the person is moving i
the wrong direction. There is no need fo
alarm provided this warning is heede
Otherwise disaster is almost certain soone
or later to follow. The laws of physiolog
are just as inexorable as the laws of physic
There is no compromising with Nature. N
man can disobey the laws of health to whic
he has been bred by Nature without payin
for it—any more than a man can sign
check against his bank account without r
ducing the amount. He may not be imm
diately bankrupt, and until he exhausts h
account he may not experience any incon
venience from his great extravagance, bu
Nature keeps her balances very accuratel
and in the end all claims must be paid.

The Personal Equation

It is true, of course, that some perso
have greater resistance than others. If

d a convenient barometer by which to easure daily the state of our vitality, we ght register the effect of every unhygienic t. But it is so seldom that endurance is curately measured that few people appre- ite the enormous differences in people and e variations of the same person at differ- t times. These differences and variations ve a range of many hundred per cent. me people can not walk upstairs or run ross the street without being out of breath, ile others will climb the Matterhorn with- t overstrain. The fact that certain people ve lived to the century-mark in spite of hygienic living is sometimes cited to prove it hygiene is ineffective. One might as ll cite the fact that certain trees are not wn down in a gale or are not quickly de- oyed by insect-pests to prove that gales ve no tendency to blow down or insects to stroy trees.

Over-Confidence

The truth is that a person who has so ch vitality as to lead him to defy the laws health and to boast that he pays no price matter how he lives, is likely to be the y man to exhaust his account of health maturely. There was, a few years ago, a nous American, possest of prodigious lily vigor. He ought to have lived a cen-

tury. Unfortunately he had this "insolen of health." He was warned several tim against overwork, lack of sleep, and abu of his digestion. But he merely smiled ar claimed that such warnings were for other not for him. He met an untimely end, du as his physicians believed and as he himse acknowledged, when too late, to his abuse the great powers with which Nature had en dowed him, that is, to the neglect of person hygiene.

Possible Health Attainments

Conversely, an observance of the laws hygiene affords wonderful results in produ ing vitality and endurance. Insurance com panies are discovering that even weak an sick people will, if they take good care themselves, outlive those with robust consti tutions who abuse them.

To those unfamiliar with the subject in i larger aspects, the possibilities seem almo beyond belief. As an example of the wo derful gains which can be secured by obe ing the laws of hygiene may be cited th case of a young man who a few years ag was scarcely able to drag himself into th sun in Colorado, where he was endeavorin to rid himself of tuberculosis. He not on succeeded, but subsequently, by dint of fo lowing substantially all of the rules

ygiene here laid down, became an athlete nd capable of running twenty-five miles for heer love of sport and apparently without he overstrain experienced by "Marathon" unners. Kant and Humboldt are cases ypical in different fields of achievement of nany of the world's most vital men who ave actually made over their constitutions rom weakness to strength. Cornaro says hat it was the neglect of hygienic laws vhich made him all but a dead man at hirty-seven, and that the thoroughgoing reorm of his habits which he then effected nade him a centenarian. His rules, drawn p four hundred years ago and described in is interesting work, "The Temperate ife," are, so far as they are explained, alnost identical with those given in this book. t is difficult to assign a limit to the good vhich can be accomplished by practising hese rules and so minimizing the poisons vhich usually narrow and shorten our lives.

Immortal Animal Cells

So far as science can reveal, there seems o be no principle limiting life. There are nany good and bad reasons why men die, ut no underlying necessary reason why hey must die. Carrel, whose work in the ar zone has contributed so much to urgical progress, has kept tissue cells of

animals alive outside of the body for th
past seven years. These cells are mult
plying and growing, apparently unchange
by time, to all appearances immortal so lon
as they are periodically washed of poiso
and nourished in a proper medium. If w
could at intervals thoroughly wash man fre
of his poisons and nourish him, there seem
to be no reason why he should not live in
definitely.*

Section V—Hygiene and Civilization

In view of the vast extent of human miser
from ill health, the question naturally arise
How does it happen that the world is bur
dened with so colossal a load? Is it no mor
than is biologically normal? Is it true tha
in other organisms, animals and plants, i
health is the rule rather than the exception
Are all races of men subject to the sam
heavy load?

Natural Adjustments Upset

These questions have not yet received suf
ficient attention. The answer seems to b
that man is suffering from his own mistake
made unconsciously and in ignorance. He ha
upset the equilibrium which Nature had es
tablished among the various powers an
activities of his body, and between himsel

* See SUPPLEMENTARY NOTES, "The Conquest of Chron
Disease."

ıd the outside world. Man has done mischief r his own body similar to that he has done r the natural resources on which he lives. . Professor Shaler's epoch-making little ›ok, "Man and the Earth," it is shown, for stance, that the little layer of soil on the rface of the earth from which plants and ıimals derive their nutriment was, before e advent of man, replenished quite as fast it was washed away, but that when man ,d put his plow into it and had taken off e protective mat of vegetation, he uncon-iously despoiled the accumulation of ages. :n a plowed field, an hour's torrential rain ay wash off to the sea more than would ,ss off in a thousand years in the slow ocess of erosion which the natural state the earth permits." He also shows that e constant croppings of the soil rob it of :rogen, phosphorus, and other elements ster than Nature restores them. The oblem of conservation is to reestablish the lance which has been lost through the dep-dations of man, for instance, to lessen soil-ısh by terracing, and to restore to the soil e lost elements by supplying nitrates and osphates and by other methods of scien-ic farming.

In the same way man has upset his pris-

tine animal mode of living and needs to fin scientific ways to restore the equilibrium Most of the present-day problems of hygien arise from introducing, uncompensated, th effects of certain devices of civilization. Th inventions of civilization have done so muc for man that he is apt to glorify them ur duly and to overlook the injurious by-prod ucts. These by-products are often of pro digious significance to the race. The inver tion of houses introduced the problem o house hygiene; the invention of clothing, th problem of clothing hygiene; that of cook ing, the problem of food hygiene; that of di vision of labor, the problem of industria hygiene; and so on. To make these state ments more concrete, we may consider som of them in more detail.

Houses Artificial

The invention of houses has made it possi ble for men to live in all climates, yet thi indoor living is responsible for much disease The houses give comfortable shelter an warmth and protect us from the element and from wild animals. But the protectio has been overdone. Like his cousin, th anthropoid ape, man is biologically an out door animal. His attempt at indoor livin has worked him woe, but so gradually an subtly has it done this that only recentl

ave we come to realize the fact. At first, wellings were really outdoor affairs, caves, ean-tos, tents, huts with holes in the roof nd the walls. These holes served to ventiute, tho they were not intended for that purose. The hole in the roof was to let out he smoke and the holes in the walls to let n the light. Gradually the roof-hole deeloped into a chimney with an open firelace, which, in turn, gradually changed into small flue for stoves, whereupon it almost eased to serve any ventilating function. 'he stove in turn has largely gone and is eplaced in many cases by the hot-water or team radiator, without any attempt at venlation. The holes in the wall gave way, fter the invention of glass, to windows 'hich let in the light without letting in the ir. Weather-strips, double windows, vestiule-doors, interior rooms, completed the rocess of depriving man of his outdoor air, utting him into a cell in which he now ves—a sickened but complaisant prisoner—ften twenty hours of the twenty-four. 'uberculosis, one of the worst scourges of ıankind, is primarily a house disease. It is revalent as indoor living is prevalent, and eaches its maximum in the tenement quarer of a great city.

Effects on Different Races

Only by generations of natural selectic could we expect to make man immune to tl evils of bad air. The robust Indian and tl Negro, whose races, until the last generatic or two, roamed in the open, fell easy prey t tuberculosis as soon as they adopted tl white man's houses and clothes. The Angl Saxons who have withstood the influence c indoor living for several generations hav probably by the survival of the fittest, b come a little better able to endure it, whil the Jews, a race which has lived indoor longer than any other existing race, ar now, probably by the same law of surviva the least liable to tuberculosis, except whe exposed to especially unfavorable condition of life.

Compensation for Civilization

But we, of this generation, can not affor to wait for natural selection to fit the race t an indoor environment; hence the suprem importance to us of air hygiene. We mus compensate for the construction of ou houses by insisting on open windows, o forced drafts, or electric fans, or open-ai outings, or sleeping porches, or the practis of deep breathing, or all of these things.

Clothing Artificial

In the same way, clothing has protecte our bodies from the cold but enervated o constricted them as well. The aborigina

ribes, even in cold climates, seldom used othing. The Eskimo is an exception. The ribes toward the South Pole in similarly old climates often have little more clothing han a blanket which they hang over their houlders toward the wind. The weak, pale kin—to whose lack of adaptability we owe he chilling preceding a cold—the bald head, he distorted foot, the corns upon it, the ramped waist, are among the results of lothing ourselves wrongly. Hence we are iscovering the need of restoring, as far as e can, the original conditions by making ur clothes more light, more loose, and more orous, and, when possible, by taking the barefoot cure," or the air bath.

We come next to foods, and note that civil- ation has invented cooking and artificial oods. These inventions have greatly idened the variety of man's diet, but the oods of civilization are largely responsible or the decay of our teeth and the abuse of ur digestive and eliminating organs. Cooking Artificial

Judging from man's teeth and digestive pparatus as well as his general kinship to he anthropoid ape, it is reasonable to be- eve that, before fire was discovered, man as primarily a frugivorous animal, whose rdinary diet consisted of fruits, nuts, and Soft Foods Artificial

stalks and green leaves of plants. While man still uses these fruits, nuts, and salads, his chief reliance is on prepared food, bread, butter, meat, and cooked vegetables. The diet of our progenitors must have been largely one requiring chewing, consisting, as it did, of hard fruits and stalks and perhaps also grains and flesh. Observation of man-like apes shows that they chew their food more thoroughly than man. Doubtless nuts constituted a considerable part of primitive food and required cracking by the teeth. The work we now do in flour-mills or the kitchen or with the knife and fork, was then done with the teeth. We even have our cooks mash our potatoes and make puddings and pap of our food after it reaches the kitchen. Having already shirked most of the task of mastication by softening and cutting our food before it reaches our mouths, we shirk the rest of it by washing it down with water, or worse. An Italian dentist, who has had a wide range of observation, says that the knife and fork have committed "unpardonable crimes" by robbing the front teeth of their work of cutting. He sometimes prescribes for loose teeth the task of cutting a pound of bread daily. Whether any of it is swallowed or not is not

nportant, but he insists that it must be cut r the teeth.

Concen-trated Food Artificial

The deplorable lack of residue in modern od is one of the consequences of civilized 'e, for the bulky foods have been crowded it by concentrated foods, and, in many ses, the concentrated foods have been rmed by getting rid of residue. Instead chewing the sugar-cane, we use sugar, a ncentrated extract which leaves no residue. 'e crush the juices from our fruits and row away the pulp. We take the bran it of our grain (and with it the vitamins sential to health). The bulky foods—uits and fibrous vegetables—are often opt from our menus.

Hurry Artificial

The hurry habit, another unfortunate by-oduct of civilized life, is one of the chief omoters of indigestion. In civilization we re by the clock. We schedule our trains d crowd our meal-time to catch them. We ake engagements in neglect of the require-ents of digestion. We have, in consequence, one of the institutions of civilization, the quick-lunch counter." At first we bolted meal purposely and consciously. Later formed the habit of food-bolting, and it w seems quite natural.

Use of Flesh Food

To the door of the hurry habit may also be laid the excessive use of flesh foods. Carnivorous animals bolt their food. Frugivorous animals, to which class the human race properly belongs, eat slowly. But when, through the perversions of civilized life, frugivorous man is forced to eat as fast as the carnivores, he instinctively adopts a similar diet. As some one has exprest it "when we eat as fast as a dog, we naturally crave the food of a dog." Our apelike progenitors had few, if any, flesh foods and only those which they could catch with the hand and eat raw. Our eliminating organs, the liver and the kidneys, have been framed to meet the demands of man's natural diet, but not adapted to handle the diet of civilized men in the excessive use of flesh foods and the use of alcohol. These organs are, fortunately or unfortunately, provided with a large factor of safety and can stand a great deal of abuse, but the cumulative effect of this abuse, especially when combined with an unhygienic life in general, sooner or later spells disaster.

Misled Appetites

Our tastes have also been perverted. The appetite is very likely to be innocently misled by the delicacies which civilization has invented, as well as by the tricks of cooking, seasoning, and preparing.

or this reason, we can not trust, as thor-
ighly as we would like, the ordinary lead-
gs of taste. The solution of this problem
nutrition, like the solution of the housing
oblem, must be sought by retaining the
lvantageous food customs which we now
id about us and substituting for the dis-
lvantageous customs scientific ones.

Other Evils of Civilization

It would be impossible to enumerate all
e inventions of civilization which have
ought us difficult problems of individual
giene. We shall name only a few more.
ie invention of chairs, tho adding to
iman convenience, has tended to produce
ong posture, from which spinal, nervous
d digestive disturbances follow. The in-
ntion of the alphabet and of printing has
ade possible the accumulation of knowl-
ge, but has promoted eye-strain with a
eat train of attendant evils. The device
division of labor has created much wealth,
t upset the normal balance of mental and
ysical work, recreation, and rest, and has
stroyed that keen interest which ought to
sorb our minds. From these upsets fol-
w occupational diseases of overstrain, bad
sture, industrial poisons, mental ennui and
scontent, and a craving for narcotics. A
mbination of conditions has lessened the

opportunities for prompt discharge of th body waste, and so led to dulling of the re flex which promotes defecation. We ar only just beginning to realize how seriou are the consequences.

"Remedies" That are Worse Than the Evils

We have described many of the unhygieni practises common to-day as direct results o upsetting Nature's equilibrium. Others ar indirect results. These latter practises ma be described as attempts to remedy the evil of the former, the "remedies," howeve being often worse than the diseases. Muc of our drugging, some of our wrong foo habits and not a little of our immorality ar simply crude and unscientific attempts t compensate for disturbances or deviation from a normal life. We wake ourselves up as it were, with caffein, move our bowel with a cathartic, induce an appetite with a cocktail, seek rest from the day's fatigu and worries in nicotin, and put ourselves t sleep with an opiate. In these practises w are evidently trying in wrong ways to com pensate respectively for insufficient sleep insufficient peristalsis, indigestion, over fatigue, and insomnia—evils due, as pre viously explained, to upsetting Nature' balance between work, play, rest and sleep.

So also our overeating is largely an un

entific effort to compensate for overcon- tration of diet,—that is, an effort to get k. Again, too much protein is in large asure due to the need of compensating rapid eating, for as has been remarked, otein is the one kind of food which can eaten fast with impunity.

Again, many parts of our moral derelic- ns are due to an unbalanced life from ich amusements are largely omitted. The ad'' boy in the city streets is usually fol- ing his instinct for amusement, of which lack of playgrounds has deprived him. sipations of many kinds are explained in imilar way. It is largely because work- n are so often drudges and lack normal reations that they seek amusement in the centrated form they find in saloons, nbling-places, dives and dance-halls.

'inally those economic and social condi- ns of civilization which have resulted in erring marriage beyond the best physio- ical age lie behind prostitution and its rible train of consequences, including the ereal diseases.

'he worst of it is that these wrong reme- s, instead of helping, aggravate the dis- e. They become part of a vicious circle, ch continues in an endless round.

Shortened Human Life

The combined effects of all the unhygienic modes of living are to greatly shorten human life. Most other mammals live about five times the growing period. In man, this would mean that the normal life-span should be about a century and a quarter, an age which is now reached only in one case out of millions.

No Return to Nature

Yet it would be foolish, even if it were possible, to attempt a complete "return to Nature" by abolishing all the ways and conventions of civilization. This would be throwing away our social inheritance and returning to barbarism. We must go forward not backward. Just as the cure for the evils of Democracy is said to be more Democracy so the cure for the evils of civilization must be more civilization. The equilibrium of Nature having been upset by civilization science, one of the great products of civilization, must now work out the remedies. Just as the waste of the soil which civilization has brought is to be compensated by that great product of civilization, scientific agriculture, so the waste of vital resources is to be compensated by scientific hygiene. The saving of civilization depends on following not those who repudiate it, like Thoreau, but those who make use of it, like Pasteur. What

e world needs is not to abolish houses, but ventilate them; not to go naked, but to vise better clothes, which have all the adntages and none of the disadvantages of ose we now wear; not to return to the diet the anthropoid apes, but to remodel that ich we have; not to give up chairs, but to prove the form of chairs; not to abandon ading, but to employ corrective eyeasses and clear printing; not to abrogate vision of labor, but to shorten the hours labor, stimulate by records of personnel, d to provide wholesome recreations d special compensating advantages when eded. When, in future centuries, these ne to be reckoned among the great umphs of civilization, we may expect hun life to be longer and perhaps stronger an in any primitive state of Nature, just where modern scientific forestry has been plied we find longer lived and better trees n ever grew in Nature's jungles.

Section VI—The Fields of Hygiene

Public Versus Individual Hygiene

The object of this book is primarily to inuct the individual as to what he can do to intain his own individual health. But inidual hygiene is only one particular nch of hygiene, and it is well for the indi-

vidual, partly out of public spirit, partly i self-defense, to have some idea of the oth important branches, namely, public hygien the hygiene practised by the health office semi-public hygiene, the hygiene of school institutions, and industrial establishment and race hygiene or eugenics, the most in portant of all.

All these branches are so closely relate that it is impossible to mark any exact divi ing-line. But, in a general way, there is broad distinction between eugenics, which the hygiene of future generations, and t other two, which relate to the present gene ation, as also between these two themselve Thus public hygiene is that which is pra tised by the government for its citizen while individual hygiene is that which practised by the citizens for themselve Public hygiene consists chiefly in efforts l the government to maintain a wholesome e vironment in which to live, including goo outdoor air—without smoke or foul odors- clean streets, pure water, good sewers, qua antine, and legal regulations concernin houses, schools, prisons, hospitals, and oth public institutions, foods sold in markets, a conditions of employment. It is chiefly usef in preventing *acute* or infectious disease

uch as typhoid fever, scarlet fever, measles, hooping-cough, smallpox, yellow fever, and iphtheria, and in preventing accidents and ccupational diseases. Individual hygiene is hiefly useful in preventing the *chronic* or degenerative diseases, that is, diseases of nutrion and of circulation, such as heart and idney affections, nervous prostration, inanity.

Public hygiene has made much progress uring recent years. In consequence, the umber of deaths from the acute or infecous diseases has been greatly diminished. [ealth officers are beginning to demonstrate ne truth of Pasteur's words, "It is within ne power of man to rid himself of every arasitic disease."

It is this work which has reduced the genral death-rate in civilized countries, somemes cutting it in two, as at Panama. he United States Public Health Service, on ıvitation of the Peruvian Government, reently cut in two the death-rate in one of eru's disease-ridden cities.

Individual hygiene, on the other hand, has een greatly neglected, especially in the nited States, and, doubtless largely as a nsequence, the death-rates from the chronic r degenerative diseases are increasing rap-

idly. A further consequence is that, in the United States, while the death-rate in the early years of life (when infectious diseases do most of the killing) has been decreasing, the death-rate in later life (when the chronic diseases do most of the killing) is increasing. In Sweden, on the other hand, where individual hygiene is more generally applied, the death-rate is declining at all times of life.*

Both public and individual hygiene are being invoked in the fight against tuberculosis, a disease at once infectious and chronic, due to germs and to wrong methods of living.

Cooperation Necessary

No matter how thoroughly an individual attempts to care for his own health, he will find it almost impossible to avoid infections, at times, without the organized help of the community in which he lives. A man may do his best to keep his windows open, to breathe deeply, to eat hygienically, to hold his activities within the limits of overfatigue, to screen his house against flies and leave no tin cans about his kitchen door to breed mosquitoes; but if the city in which he lives has no good air for him to breathe, if his city's water supply is contaminated, if neighboring malarial swamps are not drained or covered

* See "Signs of Increase in the Chronic Organic Diseases," SUPPLEMENTARY NOTES.

ith oil, if flies alight on the food before it omes to his own house, if the food contains isease germs or dangerous preservatives, r if his next-door neighbor visits him and aves infection behind him, mere personal efenses will hardly be adequate.

Even in so private a matter as moving the owels, sometimes the fault lies partly with ircumstances beyond the control of the individual. Unfortunately in most of our ties and small towns "Comfort Stations" re rare or unknown, and when they are vailable they are often in such an insaniary condition as to be a source of danger rough the spread of communicable disease. onstipation, as we have seen, is a far more erious matter than it is sometimes thought be.

It is therefore incumbent on the individual contribute his share to the hygienic work f society as a whole, in particular to take n active interest in health legislation and dministration. A man can not live to the est advantage in a life isolated from all ocial obligations, any more than Robinson rusoe could launch his canoe in the ocean, fter he had been at great pains to construct , without some one to help him. Each man hould take part in the great social hygienic

struggle, if he is to reap the highest rewards in his own personal hygienic struggle. And he can do a great deal if he will be patient and persistent. If, for instance, he would always insist on suitable air conditions in public buildings, electric cars, theaters, moving-picture houses, and churches, and encourage others to do so, it would not take long to make air reform general.

The Consumer's Duty

In fact, it is the common public, constituting the consumers, who have it in their power to bring about most of the necessary reforms in public hygiene. When the consumer really values hygienic environment the producer will supply it. The great improvement in recent years in drinking water was brought about through the appreciation by the consumer, of the danger from impure water. His complaints produced the change. Hotels found it profitable to provide and advertise pure water. So also the education of the public as to the dangers of a common public drinking-cup led to the invention of bubbling fountains and cheap individual cups and to the introduction of these conveniences in railway stations and other public places.

We need to concern ourselves particularly

vith the character of our public water supply, air supply and food supply, the number of bacteria in milk, the fitness for human consumption of the meat, fowl, fish, and shell-fish sold in the public markets, and he use of adulterants and preservatives in oodstuffs.

Quacks and Quackery

Quacks and quackery should be vigorously ought by laymen as well as physicians. Quacks live by lying and misleading advertisements. Every one should cooperate to encourage the movement by which newspapers and magazines are giving up quack and immoral advertisements and the advertisements of alcoholic beverages. Especially hould we refuse to patronize the quack advertiser. When no one is deceived by him, e will cease to advertise. A more immediate method is to change from the newspaper containing such advertising to one which does not. We should also appeal to he editors to reform their advertising, as many of them are now doing.

Vaccination

Vaccination is now a known preventive against smallpox, typhoid fever, and other germ maladies. Its use should be advocated nd the ignorant prejudice against it should e overcome.

Social Evil

Last but not least, the individual shoul cooperate in the great movement against th social evil.

The individual can help greatly in sup porting public health legislation such a that for Health Insurance and that to limi drug evils, especially the alcohol evil.

Public Health

As soon as an individual becomes inter ested in caring for his own health and fo the health of his family, his interest wil not cease at individual hygiene and he wil wish to improve the efficiency of the publi health service by increased appropriations improved equipment and personnel; and t cooperate with the health officer.

Eugenics

Race hygiene or eugenics, which has bee mentioned as the third and most importan branch of hygiene, aims to conserve th health of *future* generations, through th action of those now living. Hygiene (indi vidual and public) teaches us how to creat for ourselves healthful conditions of living but on every side we see evidences of th fact that we can not entirely control condi tions of health through hygiene only. No all maladies by any means can be attribute to unnatural or unhygienic conditions o living. It is true that if followed out faith fully, the rules of hygiene will enable a ma

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oice of a mate, which choice will still be, id rightfully, an instinctive one. Upon the isdom with which choices in marriage are ow made depends in large degree the health id efficiency of all the individuals who will nstitute society in the coming generations. s the science of eugenics gathers a greater ealth of evidence and subjects it to vigor-is analysis, its ability to guide the race to gher levels will become more positive and r-reaching. This can be done without sur-ndering the general principle of individual eedom. It will not reduce but increase the imber of natural love-marriages, for it ill restore more natural ideals less affected r extraneous circumstances such as wealth. he errors of crude and superficial or over-ithusiastic eugenists should not obscure e enormous possibilities of the science for e human race. Eugenic knowledge is, erefore, not only a personal advantage but social necessity.

For society as a whole, a thoroughgoing genic program must include:

1) The prevention of reproduction by the rkedly unfit, such as the feeble-minded, by gregating the unfit in public institutions d in extreme cases by sterilization. Social Progress

(2) The enactment of wise marriage laws.

(3) The development of an enlighten sentiment against improper marriages an the putting at the disposal of individua contemplating marriage the data accun ulated and principles worked out by eugen students. The Eugenics Record Office c Cold Spring Harbor, Long Island, N. Y., i now engaged in collecting such material.

For us of the present generation, hygien is of immediate concern; but if we are t build for future generations, hygiene mus give way to, or grow into, eugenics. Th accomplishment of a true eugenic progra will be the crowning work of the healt movement and the grandest service c science to the human race.*

* For further comments on this subject see "Eugenics" SUPPLEMENTARY NOTES.

SUPPLEMENTARY NOTES ON SPECIAL SUBJECTS

SECTION I

FOOD

e Fundamental Principles of Correct Eating

The human body is very much like an gine. It needs fuel to keep it running. As has to be built so must it be repaired from ne to time, also it must be regulated, hence, need

A—Fuel food; B—Building or repair od; C—Regulating food.

A—Fuel Foods

As in the case of an engine, the main re-rement is for fuel. Unlike an engine, wever, if the human body does not secure ficient fuel it will literally burn to death, tissues being drawn upon to supply the l. On the other hand, the human engine y easily become overstoked by an excess fuel. The following list shows the main l foods, the great foundation foods of diet, that supply energy for muscular rk. Mental work requires so little extra l that it is not necessary to consider it

specially. There are three groups of fue foods. Here they are in the order of thei cost per calory, those giving most energ for the money heading the list.

1. Starchy Foods

Cornmeal	Cornstarch
Hominy	Dried lima beans
Broken rice	Split peas, yellow
Oatmeal	Dried navy beans
Flour	Bread
Rice	Potatoes
Macaroni	Bananas
Spaghetti	

2. Sugars

Sugar	Candy
Corn syrup	Molasses
Dates	Most fruits

3. Fats

Oleõmargarine	Peanut butter
Nutmargarine	Milk
Drippings	Bacon
Lard	Butter
Salt pork	Cream

About 85% of the fuel for the body shou come from these groups, using starchy foo

the largest amount, fats next, and sugars ast.

B—Building and Repair Foods

These are divided into proteins and min- al salts.

1. *Proteins, or "Body Bricks."* These od elements are found in greatest abun- nce in lean meat of all sorts (including h, shell food and fowl), milk, cheese, eggs, as and beans, lentils and nuts. There is so a fair amount of protein in cereals and ead (about 10%), which are both building d fuel foods. Most foods contain some otein. Those above mentioned are richest protein and hence are termed "Building" "Repair Foods." All proteins are not lly adequate for growth and repair, but in ordinary mixed diet they supplement one other and insure growth and maintenance.

The following is a list of the building and pair foods in the order of their cost, those ing most building and repair material for money heading the list:

Beans (dried white)	Beans, dried lima
Dried peas	Bread
Oatmeal	Bread, whole wheat
Cornmeal	Bread, graham

Salt cod	Beef, lean round
Milk, skimmed	Lamb, leg
Cheese (American)	Eggs, 2d grade
Peanuts	Halibut
Macaroni	Porterhouse steak
Mutton, leg	Eggs, 1st grade
Beef, lean rump	Almonds, shelled
Milk	

2. *Mineral Salts.* These are found i milk, green vegetables, fruit, cereals mad from the whole grains, and egg yolks.

C—Regulating Foods

1. *Mineral Salts.* These minerals whic have been mentioned as repair foods ar also regulating foods, and help to keep th body machinery running properly.

2. *Water.* Water is an important regu lating food. Many people drink too littl Six glasses of water a day is the averag requirement—one between meals and or at meals.

3. *Ballast or Bulk.* This is furnished b cereals and vegetable fiber, which is foun in whole wheat or graham flour, in bran leaves and skins of plants, and skins an pulp of fruits. Examples are: *Vegetables*— Peas, beans, lettuce, watercress, endiv

parsnips, carrots, turnips, turnip-tops, celery, oyster plant, cabbage, Brussels sprouts, tomatoes, Spanish onions, spinach, beet-tops, kale, dandelions. *Fruit*—Apples (baked or raw), pears, currants, raspberries, cranberries, prunes, dates, figs, oranges.

4. *Hard Foods.* Vigorous use of teeth and jaws is insured by hard foods, such as crusts, hard crackers, toast, Zwieback, fibrous vegetables and fruits, celery and nuts, which are necessary to keep the teeth and gums in a healthy condition.

5. *Vitamins or "Protective" Substances.* There are minute substances present in a very small quantity in a number of foods and apparently necessary to keep the body in health. That is, the absence of these elements seems to lead to poisoning of the body, which results in such disturbances as scurvy, beri-beri, and other so-called "deficiency" diseases.

Foods containing the three vitamins in protective quantity (fat soluble A, water soluble B, water soluble C).—Tomatoes (canned and fresh), cabbage (fresh, raw), carrots, cauliflower, peas (fresh), spinach, turnips, lettuce, milk, liver.

Foods containing chiefly growth- and appetite-promoting vitamins (fat soluble A, water soluble B).—Milk, eggs (fresh and dried), whole cereals (rice, rye, oats, barley, wheat), sweet potatoes, parsnips, kidney, brain, sweetbread, fish roe, codfish, cocoanut, almonds, hickory nuts.

Foods containing chiefly anti-scorbutic and appetite-promoting vitamins (water soluble B, water soluble C).—Apples, bananas, oranges, grapefruit, lemons, limes, peas, potatoes, onions, raisins.

Foods containing chiefly appetite- and nutrition-promoting vitamins (water soluble B).—Yeast, milk, eggs, oranges, kidney beans, navy beans, Indian cornmeal, Brazil nuts, chestnuts, English walnuts, filberts.

Foods containing chiefly growth-promoting vitamin (fat soluble A).—Butter, cream, codliver oil, salmon, herring, cheese, egg yolks.

A fourth vitamin "D" has been suggested by Hess, protective against rickets and found in codliver oil. Others claim that the great excess of fat soluble A in codliver oil is the protective factor.

The above is not presented as a complete list but includes the commonly used and available foods.

Non-vitamin bearing foods.—Lard, olive oil, cottonseed oil, cocoanut oil, margarine from vegetable fat or lard, white flour, pure corn flour, polished rice, milled cereals, meat extract, pork fat, sugar.

Fruit and vegetable acids are regulating. They help to maintain the reserve alkalinity of the blood and prevent constipation.

If your diet is well diversified and includes a liberal admixture of the regulating foods your diet is safe. That is, weight in equilibrium, protein taking care of itself as a rule, excess avoided by eating meat or high protein food not more than once daily, and regulating elements supplied by milk, vegetables and fruit, and some raw food each day, the needs of the average individual are covered.

Food should be thoroughly chewed or in-

salivated in order to insure good digestion and prevent overeating, especially of protein food. This can easily be attained, not by directing attention to chewing, but by tasting the food thoroughly until it slides naturally down the gullet into the stomach. If attention is given to tasting the food during the first few chews the habit will easily be formed.

While it is not necessary to weigh your food or measure the calories or heat units that it furnishes, it is well to know the varying requirements of different types of individuals as shown in the following table:

Average Daily Food Requirement in Calories

Grandparent (70 to 80)	1,500—1,800
Father	3,000
Mother	2,500
Boy or girl of 13	3,000
Boy or girl of 9-11	2,500
Boy or girl of 7	2,100
Boy or girl of 3-4	1,100—1,400

Hard manual labor will increase requirement of father to 4,000 or more calories.

The calory is a unit of heat measurement and represents the amount of heat required to raise one kilogram of water 1 degree Centigrade or 1 lb. of water 4 degrees Fahrenheit.

Regulating Bowel Action

It is well, even for the average person, t include plenty of bulky food in the diet t prevent the bowels from becoming sluggish which is so often the case among civilize people. Where obstinate constipation ex ists, strict attention should be given to secur ing an abundance of foods in the followin classes:

(1) Foods rich in vegetable fibers, suc as celery, cabbage, string beans, dried bean and lentils with their hulls, asparagus, let tuce, spinach, onions, raisins, figs, prune and other fruits eaten with their skin cereals from which the bran has not bee removed, such as rolled or cut oats an wheat. Bran may be used in the form o bran bread, muffins, or crackers.

(2) Foods rich in vegetable acids, such a lemons, oranges, tomatoes, apples, cide and other fruits and fruit juices, excep blackberries. Fruit juices should be take early in the morning or late at night. Fruit may be eaten liberally at meal times.

(3) Foods inducing slight gas formatio such as honey, molasses, spinach, onion cauliflower. Gas tends to break up th masses in the intestines and has a stimula ing effect. Carbonated waters are likewis

serviceable in this regard. Vegetables are, of course, most acceptably taken as salads, served with olive oil, which has a laxative effect.

(4) Water, especially if taken early in the morning on an empty stomach, is helpful, except where there is extreme lack of muscular tone. Pills, purgatives, mineral waters and patent remedies should be strictly avoided as they tend to enslave the bowels.

One hour before breakfast one or two glasses of cold water, a hot and cold spray, and ten minutes' exercise should be taken. (See Section III.—Exercises 4, 5, 8, 11, 12, 13.)

As an aid to the bulky vegetable diet agar-agar may be taken. This can be had granulated or in the form of wafers, the equivalent of a teaspoonful being taken at each meal, or it can be boiled, cooled and flavored as a jelly. It is not a medicine and has no harmful effect. Mineral oil is sometimes helpful in lubricating the bowels, but it should not be used in preference to a well regulated diet. It is best taken, one or two ounces, late at night. If such measures, faithfully tried, combined with regular exercise, do not prevent constipation, an X-ray

examination should be had, and careful exploration of the stomach and bowels made in order to ascertain whether there is any structural defect or obstruction or other diseased condition.

Professor Rose suggests the following menu:

BREAKFAST

An orange; cut oats, or other whole cereal; cream; bran muffins and honey; bacon.

LUNCHEON

Lentil stew; Boston brown bread, whole wheat or graham muffins; baked apple, skin eaten.

DINNER

Vegetable soup; roast beef; spinach (large serving); baked potatoes (skins eaten); cabbage, lettuce or tomato salad; graham bread; steamed fig pudding, lemon sauce, or agar-agar jelly, flavored with lemon.

Balancing the Ration

It will help to balance the ration and to avoid an excess of protein and also to avoid a deficiency of either fat or carbohydrate,

if we take a bird's-eye view of the various common foods in respect to the protein, fat and carbohydrate they contain. For this purpose the following table has been constructed.

This is a suggested menu, which can be modified and varied by using the foods hereinbefore classified as laxative:

COMMON FOODS CLASSIFIED

	Poor in Fat	Rich in Fat	Very rich in Fat
Very high in Protein	White of Eggs Cod Fish Lean Beef Chicken Veal		
High in Protein	Shell-fish Skim Milk Lentils Peas Beans	Most Fish Most Meats Most Fowl Whole Egg Cheese	
Moderate or Deficient in Protein	Most Vegetables Bread Potatoes Fruits Sugar	Peanuts Milk Cream Soups Most Pies Doughnuts	Fat Meats Yolk of Eggs Most Nuts Cream Butter

The foods given in the uppermost compartment are those "very high" in protein (above 40 per cent. of their total calories, or food value, being protein). Those in the two compartments next below are merely "high" in protein (20 to 40 per cent.), while

the lowest three compartments contain those "moderate or deficient" in protein (zero to 20 per cent.).

The compartment farthest to the right contains a list of those foods "very rich in fat." The two compartments next to the left contain those "rich in fat," and the three compartments to the extreme left contain those "poor in fat."

With reference to carbohydrates (starch or sugar), we can say that the foods in the lower left compartment are very rich in carbohydrate. Those in the two neighboring compartments (the one beginning "shell-fish" and the one beginning "peanuts") are moderate, and those in the remaining three compartments are those poorest in carbohydrate.

Thus, practically, the nearer the name of any food is to the upper corner of this triangular table, the more protein that food contains; the nearer it is to the right hand corner, the more fat; and the nearer to the remaining corner (lower left), the more carbohydrate (starch and sugar).

Ideal Food Proportions

An ideal proportion of the three food elements is to be had only in the middle compartment of the lowest row. But it is by no means necessary or advisable to confine

e's diet to the few foods which happen to
l in that compartment, provided foods
osen from other compartments *balance*
ch other. Thus, fruit and nuts balance each
ier, the one being at the left and the other
the right of the ideal compartment. In
e same way, potatoes and cream balance
ch other, as do bread and butter. Instinc-
ely these combinations have been chosen,
pecially bread and butter. This combina-
n is, however, slightly too low in protein,
d a better balance is obtained by adding
little from the compartment vertically
ove the ideal. In this way we obtain the
niliar meat-, egg-, or cheese-sandwich, con-
tuting of itself a fairly well-balanced meal.
In short, in order to maintain a diet cor-
t as to protein, it is only necessary to
ke our main choices from the lowest row
l, in case the foods so chosen are near the
tom to supplement these by a moderate
e of those in the row above and a still more
aring use of those in the top compartment.
The following more detailed and specific
le of food values will prove helpful to
se who desire intelligently to balance
ir diet or to provide balanced menus for
ir families. A very little attention to
s subject will enable one to acquire suffi-

cient knowledge of dietetic needs to gover the diet successfully in a general way witl out weighing or measuring the food. I the following table portions of one hundre calories each are described. Thus one hu dred calories of baked beans (the fourt item in the table) are contained in a sma side-dish, the contents of which weigh 7 grams or 2.66 ounces; and of the 100 calori 21 are protein, 18 are fat, and 61 are carb hydrate.

Such a table should not, of course, l memorized, but an occasional reference to will enable one soon to acquire a workin knowledge of the food values of the ma articles in the dietary.

FOOD AND THE NUMBER OF CALORIES OF THE 100 IN THE FORM OF PROTEIN, FAT AND CARBOHYDRATE.‡

Name of Food	"Portion" Containing 100 Calories Roughly Described	Wgt. of 100 Calories		Per cent of		
		Grams	Ounces	Protein	Fat	Carbohydrate
VEGETABLES						
*Artichokes, as purchased, average, canned		430	15.	14	0	86
*Asparagus, as purchased, average, canned		540	19.	33	5	62
*Asparagus, as purchased, average, cooked		206	7.19	18	63	19
*Beans, baked, canned	Small side dish	75	2.66	21	18	61
*Beans, Lima, canned	Large side dish	126	4.44	21	4	75
*Beans, string, cooked	Five servings	480	16.66	15	48	37
*Beets, edible portion, cooked	Three servings	245	8.7	2	23	75
*Cabbage, edible portion		310	17.	20	8	72
*Carrots, edible portion, average, fresh		215	7.6	10	8	82
Carrots, cooked	Two servings	164	5.81	10	34	56
*Cauliflower, as purchased, average		312	11.	23	15	62
*Celery, edible portion, average		540	19.	24	5	71
Corn, sweet, cooked	One side dish	99	3.5	13	10	77
*Cucumbers, edible portion, average		565	20.	18	10	72
*Egg plant, edible portion, average		350	12.	17	10	73
Lentils, cooked		89	3.15	27	1	72
*Lettuce, edible portion, average		505	18.	25	14	61
*Mushrooms, as purchased, average		215	7.6	31	8	61
*Onions, fresh, edible portion, average		200	7.1	13	5	82

TABLE OF FOOD VALUES—Continued

THE WEIGHT (IN GRAMS, OUNCES AND ROUGH MEASURE) OF A PORTION CONTAINING 100 CALORIES OF EACH FOOD AND THE NUMBER OF CALORIES OF THE 100 IN THE FORM OF PROTEIN, FAT AND CARBOHYDRATE.‡

Name of Food	"Portion" Containing 100 Calories Roughly Described	Wgt. of 100 Calories		Per cent of		
		Grams	Ounces	Protein	Fat	Carbohydrate
VEGETABLES—continued						
*Onions, cooked	Two large servings	240	8.4	12	40	48
*Parsnips, edible portion, average	One and a half servings	152	5.3	10	7	83
Parsnips, cooked		163	5.74	10	34	56
*Peas, green, canned	Two servings	178	6.3	25	3	72
*Peas, green, cooked	One serving	85	3.	23	27	50
Potatoes, baked	One good sized	86	3.05	11	1	88
*Potatoes, boiled	One large sized	102	3.62	11	1	88
*Potatoes, mashed (creamed)	One serving	89	3.14	10	25	65
*Potatoes, steamed	One serving	101	3.57	11	1	88
*Potatoes, chips	One-half serving	17	.6	4	63	33
*Potatoes, sweet, cooked	Half of average potato	49	1.7	6	9	85
*Pumpkins, edible portion, average		380	13.	15	4	81
Radishes, as purchased		480	17.	18	3	79
Rhubarb, edible portion, average		430	15.	10	27	63
*Spinach, cooked, as purchased	Two ordinary servings	174	6.1	15	66	19
*Squash, edible portion, average		210	7.4	12	10	78
*Succotash, canned, as purchased, average	Ordinary serving	100	3.5	15	9	76
*Tomatoes, fresh, as purchased, average	Four average tomatoes	430	15.	15	16	69
*Tomatoes, canned		431	15.2	21	7	72
*Turnips, edible portion, average	Two large servings	246	8.7	13	4	83
Vegetable oysters		273	9.62	10	51	39

*Apples, as purchased	Two apples	206	7.3	3	7	90
Apples, baked		94	3.3	2	5	93
Apples, sauce	Ordinary serving	111	3.9	2	5	93
*Apricots, edible portion, average		168	5.92	8	0	92
Apricots, cooked	Large serving	131	4.61	6	0	94
*Bananas, yellow, edible portion, average	One large	100	3.5	5	5	90
*Blackberries, as purchased, average		170	5.9	9	16	75
Blueberries		128	4.6	3	8	89
*Blueberries, canned, as purchased		165	5.8	4	9	87
Cantaloupe	Half ordinary serving	243	8.6	6	0	94
*Cherries, edible portion, average		124	4.4	5	10	85
*Cranberries, as purchased, average		210	7.5	3	12	85
*Grapes, as purchased, average		136	4.8	5	15	80
Grape fruit		215	7.57	7	4	89
Grape juice	Small glass	120	4.2	0	0	100
Gooseberries		261	9.2	5	0	95
*Lemons		215	7.57	9	14	77
Lemon juice		246	8.77	0	0	100
Nectarines		147	5.18	4	0	96
Olives, ripe	About seven olives	37	1.31	2	91	7
*Oranges, as purchased, average	One very large	270	9.4	6	3	91
Oranges, juice	Large glass	188	6.62	0	0	100
*Peaches, as purchased, average	Three ordinary	290	10.	7	2	91
Peaches, sauce	Ordinary serving	136	4.78	4	2	94
Peaches, juice	Ordinary glass	136	4.80	0	0	100
*Pears	One large pear	173	5.40	4	7	89
Pears, sauce		113	3.98	3	4	93
*Pineapples, edible portion, average		226	8.	4	6	90
Raspberries, black		146	5.18	10	14	76
Raspberries, red		178	6.29	8	0	92
*Strawberries, as purchased, average	Two servings	260	9.1	10	15	75
*Watermelon, as purchased, average		760	27.	6	6	88

TABLE OF FOOD VALUES—Continued

THE WEIGHT (IN GRAMS, OUNCES AND ROUGH MEASURE) OF A PORTION CONTAINING 100 CALORIES OF EACH FOOD AND THE NUMBER OF CALORIES OF THE 100 IN THE FORM OF PROTEIN, FAT AND CARBOHYDRATE.‡

Name of Food	"Portion" Containing 100 Calories Roughly Described	Wgt. of 100 Calories		Per cent of		
		Grams	Ounces	Protein	Fat	Carbohydrate
COOKED MEATS						
†Beef, round, boiled (fat), 1099**	Small serving	36	1.3	40	60	00
†Beef, round, boiled (lean), 1206**	Large serving	62	2.2	90	10	00
†Beef, round, boiled (med.), 1188**	Small serving	44	1.6	60	40	00
†Beef, 5th right rib, roasted, 1538**	Half serving	18.5	.65	12	88	00
†Beef, 5th right rib, roasted, 1616**	Small serving	32	1.2	25	75	00
†Beef, 5th right rib, roasted, 1615**	Very small serving	25	.88	18	82	00
†Beef, ribs, boiled, 1169**	Small serving	30	1.1	27	73	00
†Beef, ribs, boiled, 1170**	Very small serving	25	.87	21	79	00
*Calves foot jelly, as purchased	....	112	4.	19	00	81
*Chicken, as purchased, canned	One thin slice	27	.96	23	77	00
*Lamb chops, boiled, edible portion, average	One small chop	27	.96	24	76	00
*Lamb, leg, roast	Ordinary serving	50	1.8	40	60	00
†Mutton, leg, boiled, 1184**	Large serving	34	1.2	35	65	00
†Pork, ham, boiled (fat), 1174**	Small serving	20.5	.73	14	86	00
†Pork, ham, boiled, 1192**	Ordinary serving	32.5	1.1	28	72	00
†Pork, ham, roasted (fat), 1484**	Small serving	27	.96	19	81	00
†Pork, ham, roasted (lean), 1511**	Small serving	34	1.2	33	67	00
*Turkey, as purchased, canned	Small serving	28	.99	23	77	00
†Veal, leg, boiled, 1182**	Large serving	67.5	2.4	73	27	00

*Cake, chocolate layer, as purchased	Half ordinary square piece	28	.98	7	22	71
*Cake, gingerbread, as purchased	Half ordinary square piece	27	.96	6	23	71
*Cake, sponge, as purchased	Small piece	25	.89	7	25	68
Custard, caramel		71	2.51	19	10	71
Custard, milk	Ordinary cup	122	4.29	26	56	18
Custard, tapioca	Two-thirds ordinary	69.5	2.45	9	12	79
*Doughnuts, as purchased	Half a doughnut	23	.8	6	45	49
*Lady fingers, as purchased		27	.95	10	12	78
*Macaroons, as purchased		23	.82	6	33	61
Pie, apple, as purchased	One-third ordinary piece	38	1.3	5	32	63
*Pie, cream, as purchased	One-fourth ordinary piece	30	1.1	5	32	63
*Pie, custard, as purchased	One-third ordinary piece	55	1.9	9	32	59
*Pie, lemon, as purchased	One-third ordinary piece	38	1.35	6	36	58
*Pie, mince, as purchased	One-fourth ordinary piece	35	1.2	8	38	54
*Pie, squash, as purchased	One-third ordinary piece	55	1.9	10	42	48
Pudding, apple sago		81	3.02	6	3	91
Pudding, brown betty	Half ordinary serving	56.6	2.	7	12	81
Pudding, cream rice	Very small serving	75	2.65	8	13	79
Pudding, Indian meal	Half ordinary serving	56.6	2.	12	25	63
Pudding, apple tapioca	Small serving	79	2.8	1	1	98
Tapioca, cooked	Ordinary serving	108	3.85	1	1	98
FRUITS (DRIED)						
*Apples, as purchased, average		34	1.2	3	7	90
Apricots, as purchased, average		35	1.24	7	3	90
*Dates, edible portion, average	Three large	28	.99	2	7	91
*Dates, as purchased		31	1.1	2	7	91
*Figs, edible portion, average	One large	31	1.1	5	0	95
*Prunes, edible portion, average	Three large	32	1.14	3	0	97
*Prunes, as purchased		38	1.35	3	0	97
*Raisins, edible portion, average		28	1.	3	9	88
*Raisins, as purchased		31	1.1	3	9	88

TABLE OF FOOD VALUES—Continued

THE WEIGHT (IN GRAMS, OUNCES AND ROUGH MEASURE) OF A PORTION CONTAINING 100 CALORIES OF EACH FOOD AND THE NUMBER OF CALORIES OF THE 100 IN THE FORM OF PROTEIN, FAT AND CARBOHYDRATE.‡

Name of Food	"Portion" Containing 100 Calories Roughly Described	Wgt. of 100 Calories		Per cent of		
		Grams	Ounces	Protein	Fat	Carbohydrate
CEREALS						
*Bread, brown, as purchased, average	Ordinary thick slice	43	1.5	9	7	84
*Bread, corn (johnnycake) as purchased, average	Small square	38	1.3	12	16	72
*Bread, white, home made, as purchased	Ordinary thick slice	38	1.3	13	6	81
Corn flakes, toasted	Ordinary cereal dishful	27	.97	11	1	88
*Corn meal, granular, average	....	27	.96	10	5	85
*Corn meal, unbolted, edible portion, average	....	26	.92	9	11	80
*Crackers, graham, as purchased	Two crackers	23	.82	9	20	71
*Crackers, oatmeal, as purchased	Two crackers	23	.81	11	24	65
*Hominy, cooked	Large serving	120	4.2	11	2	87
*Macaroni, average	....	27	.96	15	2	83
*Macaroni, average, cooked	Ordinary serving	110	3.85	14	15	71
*Oatmeal, average, boiled	One and a half serving	159	5.6	18	7	75
*Popcorn, average	....	24	.86	11	11	78
*Rice, uncooked	....	28	.98	9	1	90
*Rice, boiled, average	Ordinary cereal dish	87	3.1	10	1	89
*Rice, flakes	Ordinary cereal dish	27	.94	8	1	91
*Rolls, Vienna, as purchased, average	One large roll	35	1.2	12	7	81

CEREALS—continued

*Shredded wheat	One biscuit	27	.94	13	4.5	82.5
*Spaghetti, average		28	.97	12	1	87
*Wheat flour, entire wheat average		27	.96	15	5	80
*Wheat flour, graham, average		27	.96	15	5	80
*Wheat flour, patent roller process, family and straight grade spring wheat, average		27	.97	12	3	85
*Zwieback	Size of thick slice bread	23	.81	9	21	70

DAIRY PRODUCTS

*Butter, as purchased	Ordinary pat or ball	12.5	.44	.5	99.5	00
*Buttermilk, as purchased	One and a half glass	275	9.7	34	12	54
*Cheese, American, pale, as purchased	One and a half cubic in.	22	.77	25	73	2
*Cheese, cottage, as purchased	Four cubic in.	89	3.12	76	8	16
*Cheese, full cream, as purchased	One and a half cubic in.	23	.82	25	73	2
*Cheese, Neufchatel, as purchased	One and a half cubic in.	29.5	1.05	22	76	2
*Cheese, Swiss, as purchased	One and a half cubic in.	23	.8	25	74	1
*Cheese, pineapple, as purchased	One and a half cubic in.	20	.72	25	73	2
*Cream	One quarter ordinary glass	49	1.7	5	86	9
Kumyss		188	6.7	21	37	42
*Milk, condensed, sweetened, as purch.		30	1.06	10	23	67
*Milk, condensed, unsweetened (evap. cream) as purchased		59	2.05	24	50	26
*Milk, skimmed, as purchased	One and a half glasses	255	9.4	37	7	56
*Milk, whole, as purchased	Small glass	140	4.9	19	52	29
*Whey, as purchased	Two glasses	360	13	15	10	75

TABLE OF FOOD VALUES—Continued

THE WEIGHT (IN GRAMS, OUNCES AND ROUGH MEASURE) OF A PORTION CONTAINING 100 CALORIES OF EACH FOOD AND THE NUMBER OF CALORIES OF THE 100 IN THE FORM OF PROTEIN, FAT AND CARBOHYDRATE.‡

Name of Food	"Portion" Containing 100 Calories Roughly Described	Wgt. of 100 Calories		Per cent of		
		Grams	Ounces	Protein	Fat	Carbohydrate
SWEETS AND PICKLES						
*Catsup, tomato, as purchased, average	....	170	6.	10	3	87
*Honey, as purchased	Four teaspoonfuls	30	1.05	1	0	99
*Marmalade (orange peel)	....	28.3	1.	.5	2.5	97
*Molasses, cane	....	35	1.2	.5	0	99.5
*Olives, green, edible portion	Seven olives	32	1.1	1	84	15
*Olives, ripe, edible portion	Seven olives	38	1.3	2	91	7
*Pickles, mixed, as purchased	....	415	14.6	18	15	67
*Sugar, granulated	Three teaspoonfuls or one and a half lumps	24	.86	0	0	100
*Sugar, maple	Four teaspoonfuls	29	1.03	0	0	100
*Syrup, maple	Four teaspoonfuls	35	1.2	0	0	100

NUTS						
*Almonds, edible portion, average	About eight	15	.53	13	77	10
*Beechnuts		14.8	.52	13	79	8
*Brazil nuts, edible portion	Three ordinary size	14	.49	10	86	4
*Butternuts		14	.50	16	82	2
*Cocoanuts		16	.57	4	77	19
*Chestnuts, fresh, edible portion, average		40	1.4	10	20	70
*Filberts, edible portion, average	Ten nuts	14	.48	9	84	7
*Hickory nuts		13	.47	9	85	6
*Peanuts, edible portion, average	Thirteen double	18	.62	20	63	17
*Pecans, polished, edible portion	About eight	13	.46	6	87	7
*Pine nuts (pignolias), edible portion	About eighty	16	.56	22	74	4
*Walnuts, California, edible portion	About six	14	.48	10	83	7
MISCELLANEOUS						
*Eggs, hen's, boiled	One large egg	59	2.1	32	68	00
*Eggs, hen's whites		181	6.4	100	0	00
*Eggs, hen's, yolks	Two yolks	27	.94	17	83	00
*Omelet		94	3.3	34	60	6
*Soup, beef, as purchased, average		380	13.	69	14	17
*Soup, bean, as purchased, average	Very large plate	150	5.4	20	20	60
*Soup, cream of celery, as purch., average	Two plates	180	6.3	16	47	37
*Consomme, as purchased		830	29.	85	00	15
*Clam chowder, as purchased	Two plates	230	8.25	17	18	65

* Chemical Composition of American Food Materials. Atwater and Bryant. U. S. Department of Agriculture Bulletin, No. 28, office of Experiment Stations.

** Laboratory number of specimen, as per Experiments on Losses in Cooking Meat.

† Experiments on Losses in Cooking Meats (1900-03). Grindley, U. S. Department of Agriculture Bulletin, No. 141, office of Experiment Stations.

‡ Abstracted from A Graphic Method of Practical Dietetics, Irving Fisher, Journal of A. M. A., Vol. xlviii, pp. 1316-1324.

In January, 1917, the Life Extension Institute carried out a dietetic experiment with a squad of twelve policemen from the training-school of the New York City Police Department. This experiment demonstrated that even men with such high fuel requirements, averaging about 3,500 calories a day, could be maintained in vigorous health at a cost for food materials of somewhat less than 25 cents a day, showing that the average individual could be maintained for much less than that, probably 18 or 20 cents a day. Full particulars of this test, with menus, shopping lists and food costs are given in the Institute's book, entitled "Food, Fuel for the Human Engine." The men were maintained in a condition of excellent health, and found the food served palatable and satisfying. Notwithstanding the fact that they were engaged in strenuous physical exercise, such as wrestling, boxing, etc., the squad as a whole gained 29 pounds, and no member lost weight. While the experiment demonstrated that a healthful and sufficient dietary could be arranged at a cost, for the average hard-working man, of 20 cents a day, it also demonstrated that at present market prices there would be some difficulty, without some knowledge of food

values, in arranging such a dietary at that cost. It is hoped that this public experiment will make available to the millions who are compelled to live within these cost limitations the knowledge required in order to properly govern the diet.

Since the experiment there has been a very rapid rise in the price of foodstuffs, which would require a material modification of previous estimates of the minimum cost of a healthful maintenance diet.

Cost of Ready-to-Serve Food.

The table on page 214 has been compiled by Gephart and Lusk ("Analysis and Cost of Ready to Serve Foods"), and shows in convenient form relative energy values and cost of the more commonly used articles of food.

A brief glance at this table will show how easily one might slowly starve on very expensive food, and yet how easily the energy food needed can be secured at a low cost.

It would, of course, be a great mistake to regulate the diet solely with regard to fuel value. Digestibility, as well as available amino-acids from protein, mineral and vitamin requirements, must also be considered. Nevertheless, the main requirement is for fuel, and this, as the table shows, can be secured at a surprizingly low cost.

The prices quoted are those maintained in the latter half of the year 1918.

No.	Name of Food	Constituents: Food	Constituents: Gm.	Cost, Dollars	Calories in Sample: Total Number of Calories by Actual Test	Calories in Sample: Protein
1	Apple, baked	Total sample	114.9	$0.10	137.2	1.4
2	Apple baked (with cream)	Total sample	228.8	.10	393.7	5.8
3	Apple, baked (with ice cream)	Total sample	206.3	.10	275.5	12.5
4	Apple fritters with fruit sauce	Total sample	155.9	.10	330.8	26.3
5	Apple sauce	Total sample	154.7	.05	145.3	3.8
6	Asparagus, creamed on toast	Toast	35.2	.20	209.6	45.3
		Asparagus	210.6			
7	Bacon, broiled	Bacon	40.7	.40	760.8	70.2
		Potatoes	70.2			
		Bread plus butter	74.2			
8	Bacon and eggs	Bacon	32.7	.50	818.1	148.1
		Eggs	74.8			
		Potatoes	68.5			
		Bread plus butter	67.6			
9	Bacon, fried, with French fried potatoes	Bacon	44.3	.20	858.9	94.1
		Potatoes	51.8			
		Rolls	84.9			
		Butter	11.4			
10	Bananas, sliced	Total sample (edible)	104.2	.05	91.5	5.6
11	Bananas, sliced with cream	Bananas (edible)	123.9	.10	256.6	15.2
		Cream	61.5			
12	Beans, baked with macaroni	Beans	140.8	.15	623.1	126.9
		Macaroni	119.2			
13	Beans Boston baked (average 6 orders)	Beans (average)	207.2	.15	509.4	102.1
		Per cent, variation from average	+12.3% −15.6%	....	+26.7% −22.6%	+15.6% −13.6%
		Bread and butter (average)	48.0			
		Per cent. variation from average	+14.4% −9.0%			
14	Beans, Boston (on the side)	Total sample	77.0	.10	143.2	33.5

15	Beans, New York baked (average 7 orders)	Beans (average)	191.2	$0.15	489.8	108.1
		Per cent. variation from average	+30.2% −28.7%	....	+30.4% −26.0%	+15.6% −24.2%
		Bread and butter (average)	47.7			
		Per cent. variation from average	+10.0% −11.0%			
16	Beans, New York (on the side)	Total sample	130.9	.10	240.0	59.1
17	Beans, New York baked, with tomato sauce	Beans and sauce	197.8	.10	430.5	97.5
		Bread and butter	40.9			
18	Beef cakes with brown gravy and macaroni	Cakes, macaroni and gravy	339.5	.15	709.7	125.2
		Bread and butter	69.2			
19	Beef, chipped and scrambled eggs	Beef and eggs	135.4	.20	779.3	172.2
		Potatoes	61.4			
		Bread and butter	77.8			
20	Beef, corned	Beef	68.3	.15	436.2	138.2
		Bread and butter	53.2			
21	Beef, corned, and Boston beans	Beef	40.6	.25	538.4	135.4
		Beans	102.6			
		Bread and butter	71.1			
22	Beef, corned, and New York beans	Beef	96.8 ?	.25	577.6	142.6
		Beans	156.3			
		Bread and butter	98.6 ?			
23	Beef, corned, hash with poached egg	Beef hash	134.8	.40	680.0	157.3
		Egg	42.3			
		Bread and butter	65.9			
24	Beef, corned, hash browned in pan	Hash	123.9	.25	538.3	97.5
		Bread and butter	68.9			
25	Beef, corned, hash brown with two poached eggs	Hash	157.1	.25	795.5	158.7
		Bread and butter	82.6			
		Eggs	63.1			
26	Beef, corned, hash (steamed)	Hash	149.4	.15	533.8	91.5
		Bread and butter	82.8			
27	Beef, corned, hash (steamed) with poached egg	Hash and egg	148.5	.20	575.1	141.6
		Bread and butter	69.3			
28	Beef, corned, with potato salad	Beef	29.0	.15	456.3	95.5
		Potato salad	114.6			
		Bread and butter	66.5			
29	Beef, creamed chipped	Beef, etc.	210.2	.15	536.3	160.1
		Bread and butter	73.7			

No.	Name of Food	Constituents: Food	Constituents: Gm.	Cost, Dollars	Calories in Sample: Total Number of Calories by Actual Test	Calories in Sample: Protein
30	Beef, creamed chipped, on toast	Beef	89.4	$0.15	795.6	170.3
		Sauce	94.3			
		Toast	32.9			
		Rolls	75.8			
		Butter	12.8			
31	Beef, roast, cold	Roast beef	79.2	.15	464.2	115.7
		Bread and butter	77.8			
32	Beef, roast, croquettes with macaroni	Croquettes	85.2	.15	657.5	115.3
		Macaroni	93.1			
		Mashed potatoes	123.5			
		Bread and butter	62.7			
33	Beef, roast, croquettes with spaghetti	Croquettes	113.7	.15	579.1	106.9
		Spaghetti	102.6			
		Potatoes	126.4			
34	Beef, roast, cutlet, mashed potatoes	Beef cutlet	112.4	.15	653.7	129.9
		Potatoes and gravy	122.6			
		Bread and butter	69.1			
35	Beef, roast, cutlet with tomato sauce	Cutlet	121.8	.15	787.2	168.8
		French fried potatoes and tomato sauce	85.4			
		Bread and butter	83.0			
36	Beef, roast, hash, browned	Hash	196.8	.15	701.4	124.3
		Bread and butter	71.9			
37	Beef, roast, with potato salad	Beef	70.3	.25	577.5	143.2
		Potato salad	151.2			
		Bread and butter	68.8			
38	Beef, roast sirloin of, and mashed potatoes	Beef	72.6	.20	539.6	141.8
		Potatoes and gravy	164.5			
		Bread and butter	65.4			
39	Blackberries and cream	Blackberries (sugared)	108.5	.10	225.2	15.6
		Cream	60.0			
40	Bread, hot corn	Total sample	153.2	.10	474.1	60.5

42	Buns, bath	Total sample	96.5	.05	370.0	44.5
43	Cakes, buckwheat, with country sausage	Cakes	135.3	.20	655.4	129.5
		Sausage	70.6			
		Butter	16.0			
44	Cakes, buckwheat, with maple cane syrup	Cakes	145.1	.10	430.6	50.1
		Syrup	43.8			
45	Cakes, butter (average 2 orders)	Total sample (av.)	96.2	.05	291.0	46.1
		Per cent. variation from average	+5.5%	......	+7.8%	+5.8%
			−5.5%	......	−7.8%	−5.8%
46	Cakes, chocolate, spiced	Total sample	95.2	.05	330.5	23.1
47	Cake, cocoanut	Total sample	53.7	.05	209.7	18.2
48	Cake, Coffee	Total sample	82.4	.05	299.9	34.3
49	Cakes, cornmeal, with maple cane syrup	Cakes	174.4	.15	565.5	53.7
		Syrup	37.4			
50	Cake, banana layer	Total sample	83.4	.10	260.0	23.5
51	Cake, chocolate layer	Total sample	65.6	.10	218.3	20.7
52	Cake, walnut layer, with marshmallow icing	Total sample	84.1	.05	332.3	32.4
53	Cake, old fashioned molasses	Total sample	82.7	.05	288.8	24.6
54	Cake, pound	Total sample	87.0	.10	393.0	35.9
55	Cakes, rice, with maple cane syrup	Total sample	270.3	.15	575.3	65.5
56	Cakes, wheat, with maple cane syrup (average 6 orders)	Total samlpe (av.)	188.2	.15	476.2	49.9
		Per cent. variation from average	+15.6%	......	+14.1%	+14.4%
			−13.3%	......	−13.2%	−12.8%
57	Cantaloup	Edible portion	127.0	.15	37.4	4.1
58	Champagne	Total sample	375.5*	2.00	344.9	From alcohol
59	Charlotte Russe	Total sample	43.5	.05	161.3	17.2
60	Chicken, creamed, on toast	Chicken and Toast	160.7	.20	400.2	102.3
		Bread and butter	40.6			
61	Chicken croquette and French fried potatoes	Croquette	87.4	.25	499.7	77.5
		Potatoes	96.1			
62	Chicken cutlet with mashed potatoes	Cutlet	86.5	.15	602.2	101.0
		Potatoes	105.5			
		Bread and butter	96.4			
63	Chicken giblets on toast	Giblets and Toast	177.2	.20	673.5	217.8
		Potatoes	124.2			
		Bread and butter	74.3			
64	Chicken hash	Hash	124.3	.15	468.1	97.1
		Bread and butter	59.6			

* Cubic centimeters.

No.	Name of Food	Constituents: Food	Constituents: Gm.	Cost, Dollars	Calories in Sample: Total Number of Calories by Actual Test	Calories in Sample: Protein
65	Chicken wings on toast	Total edible chicken	388.6	$0.20	753.4	285.6
		Toast and potatoes, Bread and Butter	75.0			
66	Clam chowder	Chowder	413.2	.15	429.5	96.1
		Crackers	46.0			
67	Cocoa	Total sample	257.3	.10	256.7	32.9
68	Codfish, creamed, on toast (average 2 orders)	Codfish (average)	152.8	.15	567.8	155.6
		Per cent. variation from average	+4.1% −4.1%	....	+8.6% −8.6%	+4.9% −4.9%
		Toast (average)	44.1			
		Per cent. variation from average	+6.1% −6.1%			
		Bread and butter (average)	70.8			
		Per cent. variation from average	+14.4% −14.4%			
69	Coffee, cup of, containing cream and sugar	Total sample	327.8	.05	402.9	27.5
70	Corn, stewed	Total sample	70.1	.05	54.5	7.0
71	Corn flakes and milk	Corn flakes	19.3	.15	237.5	54.7
		Milk	233.5			
72	Cornstarch, chocolate	Total sample	160.5	.05	239.3	27.4
73	Cornstarch, chocolate	Total sample	160.9	.05	164.1	16.2
		Cream lost				
74	Cornstarch, strawberry	Total sample	119.7	.05	102.5	1.3
75	Cornstarch, vanilla	Total sample	172.2	.05	213.9	26.1
76	Crab, deviled (average 2 orders)	Crab (edible) (av.)	81.4%	.20	386.6	84.9
		Per cent. variation from average	+11.8% −11.8%	....	+9.3% −9.3%	+7.8% −7.8%
		Bread and butter (average)	67.8			
		Per cent. variation from average	+0.6% −0.6%			
		Water cress (av)	15.4			
		Per cent. variation	+26.5%			

		from average.......	−5.3%	......	−4.6%	−0.7%
78	Crackers, milk	Total sample	72.6	.05	326.6	33.5
79	Crackers, milk, and milk	Crackers	70.8	.15	483.6	80.2
		Milk	226.9			
80	Crackers, soda, and milk	Crackers	52.5	.15	397.4	71.6
		Milk	238.7			
81	Cream	Total sample	239.0	.15	515.9	35.5
82	Cream roll	Total sample	47.4	.05	230.4	18.8
83	Cream of wheat	Total sample	205.9	.10	135.2	32.9
84	Crullers	Total sample	110.7	.05	457.0	46.0
85	Custard, baked apple, with whipped cream	Total sample	193.9	.10	269.3	22.7
86	Custard, cup	Total sample	189.7	.15	234.1	53.4
87	Eclair, chocolate	Total sample	74.9	.05	193.4	19.2
88	Eggs, boiled (2)	Eggs (edible)	91.6	.30	391.0	92.8
		Toast and butter	42.0			
89	Eggs, creamed on toast	Creamed eggs	193.6	.35	663.9	146.6
		Toast	48.4			
		Bread and butter	68.3			
90	Eggs, fried (2) (average 2 orders)	Eggs (average)	84.7	.30	527.8	105.8
		Per cent. variation from average	+9.9% −9.9%	....	+4.0% −4.0%	+2.3% −2.3%
		Bread and butter (average)	84.5			
		Per cent. variation from average	+14.4% −14.4%			
91	Egg plant fried in butter	Total sample	154.0	.15	637.6	46.8
92	Eggs, poached on toast (2)	Eggs	83.1	.35	286.2	84.5
		Toast	48.3			
93	Eggs, scrambled (2)	Eggs	64.6	.30	461.1	78.7
		Bread and butter	67.6			
94	Fish cakes with macaroni	Cakes	143.7	.20	537.8	107.1
		Macaroni	91.4			
		Bread and butter	58.1			
95	Fish cakes with poached egg	Fish cakes	118.1	.20	603.8	129.5
		Poached egg	44.3			
		Bread and butter	88.1			
96	Fish cakes with spaghetti	Fish cakes	122.8	.20	512.9	108.4
		Spaghetti	141.2			
		Bread and butter	76.1			

No.	Name of Food	Constituents: Food	Constituents: Gm.	Cost, Dollars	Calories in Sample: Total Number of Calories by Actual Test	Calories in Sample: Protein
97	Fish cakes with tomato sauce	Fish cakes	153.6	$0.15	506.5	81.0
		Bread and butter	76.9			
98	Frankfurters and potato salad	Frankfurters	65.4	.15	619.8	114.0
		Potato salad	158.6			
		Bread and butter	72.9			
99	Grape fruit	Edible portion	189.3	.20	79.0	6.3
100	Ham, broiled	Ham	90.2	.30	936.7	158.0
		Bread	67.7			
		Potatoes	106.6			
101	Ham, cold	Ham	65.6	.15	574.8	86.6
		Bread and butter	63.7			
102	Ham croquettes	Croquettes	82.1	.10	556.8	108.8
		Mashed potatoes and gravy	166.3			
		Bread and butter	50.2			
103	Ham, fried	Ham	63.6	.40	468.2	120.6
		Bread and butter	62.7			
104	Ham and beans (Boston)	Ham	42.6	.25	638.5	122.4
		Beans	107.6			
		Bread and butter	78.8			
105	Ham and beans (New York)	Ham	35.9	.25	662.0	149.6
		Beans	176.9			
		Bread and butter	72.8			
106	Ham and eggs (average 9 orders)	Ham (average)	53.7	.50	842.6	181.9
		Per cent. variation from average	+40.0% −26.3%	....	+15.0% −20.6%	+18.2% −12.2%
		Eggs (average)	73.5			
		Per cent. variation from average	+20.5% −21.8%			
		Potatoes (average)	79.0			
		Per cent. variation from average	+58.3% −33.6%			
		Bread and butter (average)	68.9			

		French fried potatoes	72.4			
		Bread and butter	75.4			
108	Ham and potato salad	Ham	67.7	.35	665.3	116.5
		Potato salad	177.5			
		Bread and butter	57.5			
109	Ice cream, strawberry	Total sample	105.3	.10	208.3	14.9
110	Ice cream, vanilla	Total sample	134.8	.15	233.7	21.9
111	Jelly, pineapple fruit, with whipped cream	Total sample	110.7	.05	113.5	13.4
112	Jelly, strawberry fruit, with whipped cream	Total sample	128.2	.05	155.8	3.2
113	Lamb chops (2)	Chops (edible)	55.0	.30	852.9	146.5
		Potatoes	85.1			
		Toast and butter	18.5			
		Bread and butter	71.3			
114	Lamb chops breaded with mashed potatoes	Chops (edible)	42.6	.20	554.9	85.4
		Potatoes and gravy	111.1			
		Bread and butter	75.4			
115	Lamb croquettes and mashed potatoes	Croquettes	134.9	.15	918.4	156.8
		Potatoes and sauce	189.0			
		Bread and butter	75.4			
116	Lamb cutlet with mashed potatoes	Cutlet	99.5	.15	651.8	126.3
		Potatoes	120.6			
		Bread and butter	66.5			
117	Lamb pie, baked, individual	Pie	213.5	.15	613.4	178.1
		Bread and butter	76.7			
118	Liver and bacon	Liver	63.9	.30	797.2	177.5
		Bacon	16.3			
		Bread and butter	79.4			
		Potatoes	85.4			
119	Liver and bacon with lyonnaise potatoes	Liver	127.3	.25	814.5	210.9
		Bacon	20.6			
		Potatoes	155.9			
		Bread and butter	65.6			
120	Liver and onions with French fried potatoes	Liver	51.8	.30	838.5	135.8
		Onions and gravy	55.5			
		French fried potatoes	57.8			
		Rolls and butter	81.8			

No.	Name of Food	Constituents: Food	Constituents: Gm.	Cost, Dollars	Calories in Sample: Total Number of Calories by Actual Test	Calories in Sample: Protein
121	Liver, fried, with mashed potatoes....	Liver and gravy......	90.5	$0.30	532.3	134.9
		Potatoes...........	129.8			
		Bread and butter.....	74.7			
122	Macaroni, side order................	Total sample.........	119.8	.10	133.3	26.7
123	Macaroni, baked, and cheese.........	Macaroni and cheese..	212.1	.10	382.8	69.5
		Bread and butter.....	42.9			
124	Mackerel, broiled salt, with mashed potatoes	Mackerel (edible).....	100.8	.20	830.1	218.0
		Potatoes...........	112.1			
		Bread and butter.....	98.9			
125	Maple flakes with milk..............	Maple flakes.........	31.3	.10	283.4	64.0
		Milk..............	234.6			
126	Meat cakes, German, with French fried potatoes	Meat cakes..........	123.5	.15	890.2	130.6
		Potatoes...........	112.8			
		Bread and butter.....	67.8			
127	Meat cakes, German, with Lyonnaise potatoes	Meat cakes..........	156.3	.15	788.6	175.2
		Potatoes...........	103.2			
		Bread..............	54.7			
128	Milk..........................	Total sample.........	453.6	.10	312.8	79.0
129	Muffins, corn.....................	Total sample.........	101.3	.05	352.3	35.9
130	Muffins, hot corn..................	Total sample.........	103.5	.05	341.5	47.6
131	Napoleon.........................	Total sample.........	113.1	.05	461.7	28.8
132	Oatmeal, fresh cooked, with cream....	Oatmeal...........	195.9	.15	396.3	47.1
		Cream.............	95.8			
133	Omelet, chicken..................	Omelet............	132.4	.25	494.0	141.5
		Bread and butter.....	42.5			
134	Omelet, ham......................	Omelet............	116.7	.35	703.7	146.6
		Potatoes...........	68.4			
		Bread and butter.....	68.6			
135	Omelet, macaroni, with tomato sauce.	Omelet............	249.6	.25	636.7	145.7
		Bread and butter.....	66.9			
136	Omelet, Onion..................	Omelet............	197.6	.35	552.7	128.3

	Omelet, plain (average 3 orders)......	Omelet (average).....	109.9	.30	529.5	117.2
		Per cent. variation from average.......	+5.8% −8.0%	....	+28.1% −14.7%	+17.4% −15.1%
		Bread and butter (average)...........	68.5			
		Per cent. variation from average........	+52.1% −46.6%			
139	Omelet, Spanish, with French fried potatoes	Omelet..............	182.7	.40	697.7	134.8
		Potatoes............	59.0			
		Bread and butter.....	76.9			
140	Omelet, tomato........	Omelet..............	178.9	.35	738.5	145.6
		Rolls and butter.....	112.6			
141	Omelet, tomato, with potatoes.......	Omelet..............	170.5	.25	633.2	83.3
		Potatoes............	78.5			
		Bread and butter.....	76.5			
142	Oyster fry, large (average 2 orders)...	Oysters (average).....	191.8	.25	844.3	125.4
		Per cent. variation from average.......	+5.2% −5.2%	....	+1.0% −1.0%	+3.8% −3.8%
		Bread and butter..... (average)...........	82.9			
		Per cent. variation from average.......	+10.4% −10.4%			
143	Oyster fry, plain, with bacon.........	Oyster fry..........	196.1	.45	1,076.2	162.2
		Bacon.............	17.3			
		Bread and butter.....	96.3			
144	Oyster fry, small...................	Oyster fry..........	167.9	.35	729.7	117.6
		Bread and butter.....	74.4			
145	Oyster pie.........................	Total sample.........	298.2	.15	690.4	103.7
146	Oysters, raw.......................	Total sample.........	98.6	.15	64.9	32.0
147	Pie, apple.........................	Total sample.........	137.5	.10	343.1	20.9
148	Pie, blackberry....................	Total sample.........	145.2	.10	361.7	20.8
149	Pie, cherry (average 2 orders)........	Total sample (av.)	170.3	.10	389.5	23.3
		Per cent. variation from average.......	+12.6% −12.6%	....	+8.0% −8.0%	+27.4% −27.4%
150	Pie, cocoanut......................	Total sample.........	174.3	.10	389.7	59.7
151	Pie, huckleberry...................	Total sample.........	159.6	.10	363.9	15.9
152	Pie, lemon.........................	Total sample.........	146.1	.10	284.8	18.2
153	Pie, mince.....	Total sample.........	177.4	.10	401.1	45.9
154	Pie, peach	Total sample.........	169.6	.10	368.4	16.5

No.	Nane of Food	Constituents: Food	Constituents: Gm.	Cost, Dollars	Calories in Sample: Total Number of Calories by Actual Test	Calories in Sample: Protein
155	Pie, pineapple	Total sample	161.5	$0.10	353.0	20.0
156	Pie, pumpkin	Total sample	170.9	.10	307.6	40.7
157	Pie, rhubarb	Total sample	116.2	.05	291.3	15.9
158	Pie, strawberry	Total sample	149.5	.10	382.7	23.5
159	Pineapple, sliced (average 2 orders)	Pineapple (average)	124.2	.05	36.5	4.1
		Per cent. variation from average	+0.02% −0.02%			
160	Pork and beans, Boston	Pork	62.2	.25	868.0	135.1
		Beans	166.1			
		Bread and butter	65.7			
161	Pork and beans, New York (average 2 orders)	Pork (average)	23.6	.25	631.1	124.9
		Per cent. variation from average	+3.8% −3.8%	....	+6.6% −6.6%	+9.0% −9.0%
		Beans (average)	161.2			
		Per cent. variation from average	+3.4% −3.4%			
		Bread and butter (average)	67.1			
		Per cent. variation from average	+2.9% −2.9%			
162	Potatoes, French fried, extra order	Total sample	131.7	.10	329.8	31.8
163	Pudding, bread, with vanilla sauce	Total sample	201.8	.05	311.9	47.7
164	Pudding, bread, custard	Total sample	203.9	.05	371.4	56.8
165	Pudding, cabinet, with vanilla sauce (average 2 orders)	Total sample (av.)	217.8	.05	416.8	61.6
		Per cent. variation from average	+11.0% −11.0%	....	+22.5% −22.5%	+19.6% −19.6%
166	Pudding, Indian, with maple sauce	Total sample	167.9	.05	237.0	34.7
167	Pudding, New England, with vanilla sauce	Total sample	244.5	.05	342.3	41.0
168	Pudding, rice, cold	Total sample	227.7	.05	275.4	43.6
169	Pudding, tapioca apple	Total sample	224.5	.10	225.5	29.4
170	Pudding, tapioca creamed	Total sample	64.8	.10	197.9	29.3
171	Rhubarb, stewed	Total sample	118.3	.05	95.0	4.0

172	Rice, boiled, side order	Total sample	161.6	$0.05	135.6	17.0
173	Rice croquette with bacon (average 2 orders)	Rice croquette (av.)	97.2	.15	611.0	79.3
		Per cent. variation from average	+17.5% −17.5%	....	+12.7% −12.7%	+6.0% −6.0%
		Bacon (average)	4.9			
		Per cent. variation from average	+3.1% −3.1%			
		Potatoes and sauce (average)	132.4			
		Per cent. variation from average	+13.5% −13.5%			
		Bread and butter (average)	74.7			
		Per cent. variation from average	+1.2% −1.2%			
174	Rice, hot, with butter	Total sample	188.3	.10	313.0	27.5
175	Rice, hot, with cream	Rice, sugar, cream	338.4	.15	533.8	48.5
176	Rice, hot, with milk	Total sample	298.7	.15	294.2	53.4
177	Rice, hot, with poached egg	Rice	153.1	.15	452.5	80.4
		Poached egg	48.1			
		Bread and Butter	62.5			
178	Roast, Vienna, with French fried potatoes	Roast	181.4	.15	886.4	183.5
		Potatoes	71.4			
		Bread and butter	72.6			
179	Roast, Vienna, with spaghetti and potatoes	Vienna roast	103.9	.15	749.4	143.7
		Spaghetti	69.4			
		Mashed potatoes	98.8			
		Buttered bread	70.5			
		Butter	10.7			
180	Roast, Vienna, with stewed tomatoes	Roast and tomatoes	136.1	.15	553.2	103.4
		Bread and butter	47.8			
181	Salad, crab meat	Crab meat	114.0	.20	437.7	140.9
		Lettuce	34.5			
		Boiled egg	13.7			
		Bread and butter	79.1			
182	Salad, egg	Eggs	117.6	.40	497.8	119.8
		Lettuce	31.7			
		Bread and butter	74.5			
183	Salad, potato	Potatoes, etc.	227.6	.15	448.3	50.9
		Lettuce	18.3			
		Bread and butter	48.7			
184	Salad, tuna fish	Salad	166.0	.25	591.3	131.0
		Bread and butter	69.8			

No.	Name of Food	Constituents		Cost, Dollars	in Sample Calories	
		Food	Gm.		Total Number of Calories by Actual Test	Protein
185	Sandwich, American cheese	Total sample	63.7	$0.05	244.2	49.7
186	Sandwich, chicken sliced	Total sample	50.0	.20	167.0	38.6
187	Sandwich, Chicken salad	Total sample	92.0	.10	282.9	48.2
188	Sandwich, club	Toast	73.3	.50	438.6	111.3
		Lettuce	10.8			
		Chicken and bacon	42.4			
189	Sandwich, corned beef (average 18 orders)	Corned beef (av.)	17.5	.05	201.4	54.6
		Per cent. variation from average	+44.5% −50.9%	....	+26.0% −24.9%	+39.1% −37.7%
		Bread and butter (average)	43.0			
		Per cent. variation from average	+17.4% −26.1%			
190	Sandwich, cream cheese, walnut	Total sample	58.3	.05	209.8	29.2
191	Sandwich, fried egg	Egg	38.8	.15	276.0	59.8
		Bread and butter	49.0			
192	Sandwich, fish cake	Fish cake	56.9	.10	253.2	62.6
		Bread (no butter)	47.5			
193	Sandwich, ham (average 18 orders)	Ham (average)	18.3	.10	212.1	48.4
		Per cent. variation from average	+47.0% −50.8%	....	+22.0% −15.4%	+28.3% −22.2%
		Bread and butter (average)	42.4			
		Per cent. variation from average	+19.6% −19.6%			
194	Sandwich, ham, with roll	Ham	13.9	.05	273.8	42.5
		Roll	52.4			
195	Sandwich, Minced chicken	Chicken	20.6	.05	235.1	52.5
		Bread and butter	47.0			
196	Sandwich, minced chicken, with lettuce	Total sample	78.6	.10	182.3	34.7
197	Sandwich, minced ham	Ham	18.3	.10	291.1	49.0
		Bread and butter	51.7			
198	Sandwich, minced ham, with olives	Total sample	61.6	.05	219.4	44.7

199	Sandwich, minced tongue, with tea biscuits	Total sample	76.2	$0.05	239.5	49.4
200	Sandwich, oyster	Oyster	61.4	.10	321.9	50.7
		Bread	41.4			
201	Sandwich, Pimento, olive, cheese	Cheese, etc	6.1	.05	159.5	25.6
		Bread and butter	38.7			
202	Sandwich, roast beef, hot	Beef	37.4	.15	263.9	69.3
		Bread and gravy	62.3			
203	Sandwich, roast beef, with roll	Roast beef	50.3	.05	385.9	99.7
		Roll	54.7			
204	Sandwich, sardine	Total sample	59.5	.05	217.9	37.1
205	Sandwich, Swiss cheese	Swiss cheese	20.8	.05	258.5	51.5
		Bread and butter	42.5			
206	Sandwich, tomato	Tomatoes	16.0	.10	140.0	22.8
		Lettuce	5.1			
		Bread and butter	43.4			
207	Sausage, country	Total sample	81.0	.05	243.9	57.6
208	Sausage, country, and French fried potatoes	Sausage	53.8	.35	521.7	71.5
		Potatoes and gravy	106.5			
209	Shad, baked, and dressing	Shad (edible)	149.7	.20	680.9	178.5
		Potatoes and dressing	130.6			
		Bread	65.5			
210	Shortcake, strawberry	Total sample	122.9	.15	283.1	27.6
211	Shredded wheat and cream	Shredded wheat	60.6	.15	494.5	56.4
		Cream	102.0			
212	Shredded wheat and milk	Shredded wheat	61.4	.10	404.5	81.2
		Milk	220.1			
213	Soup, bean, with croutons	Total sample	300.5	.10	180.8	42.5
214	Soup, chicken	Chicken soup	369.6	.15	321.1	70.6
		Bread and butter	43.6			
215	Soup, green split pea	Soup	220.3	.10	241.1	45.9
		Bread and butter	39.7			
216	Soup, tomato, with rice	Total sample	222.0	.10	77.5	15.7
217	Soup, vegetable	Soup	227.9	.10	206.1	35.1
		Bread and butter	45.6			
218	Spaghetti and cheese	Total sample	212.9	.10	187.8	42.4
219	Spaghetti, baked with cheese	Total sample	168.9	.10	166.4	36.6
220	Steak, hamburger	Steak	94.0	.20	723.8	147.9
		Potatoes	131.0			
		Bread and butter	59.6			

No.	Name of Food	Constituents: Food	Constituents: Gm.	Cost, Dollars	Calories in Sample: Total Number of Calories by Actual Test	Calories in Sample: Protein
221	Steak, hamburger, with Spanish sauce	Steak	109.2	$0.20	681.3	183.3
		Spanish sauce	85.4			
		French fried potatoes	65.7			
		Bread and butter	61.9			
222	Steak, sirloin	Steak	262.7	.50	1,393.0	397.8
		Potatoes	96.5			
		Water cress	5.4			
		Bread and butter	75.1			
223	Steak, sirloin, with onions	Steak	182.9	.55	1,314.0	369.4
		Onions	63.4			
		Potatoes	95.7			
		Bread and butter	71.2			
224	Steak, small (average 2 orders)	Steak (average)	146.5	.35	1,032.8	237.5
		Per cent. variation from average	+1.0% −1.0%	....	+10.4% −10.4%	+3.8% −3.8%
		Potatoes (average)	70.9			
		Per cent. variation from average	+21.2% −21.2%			
		Bread (average)	70.2			
		Per cent. variation from average	+2.8% −2.8%			
		Butter (average)	9.6			
		Per cent. variation from average	+47.0% −47.0%			
225	Steak, small, with onions	Steak	134.5	.40	1,024.0	275.0
		Onions	57.7			
		Potatoes	96.8			
		Bread and butter	71.2			
226	Steak, tenderloin	Steak	213.3	.55	1,268.0	349.8
		Potatoes	133.8			
		Bread and butter	67.6			

227	Steak, tenderloin, with onions	Steak	222.7	$0.60	1,463.0	368.4
		Onions	46.2			
		Potatoes	123.7			
		Bread and butter	97.4			
228	Stew, beef (average 9 orders)	Stew (average)	408.3	.15	641.4	148.4
		Per cent. variation from average	+20.8%	......	+24.1%	+22.4%
			−10.8%	......	−20.7%	−34.4%
		Bread and butter (average)	61.8			
		Per cent. variation from average	+25.4%			
			−35.3%			
229	Stew, lamb (average 2 orders)	Stew (average)	355.9	.30	622.2	146.8
		Per cent. variation from average	+4.1%	......	+6.5%	+4.4%
			−4.1%	......	−6.5%	−4.4%
		Bread and butter (average)	67.3			
		Per cent. variation from average	+6.0%			
			−6.0%			
230	Strawberries with cream	Strawberries	142.0	.15	280.7	17.9
		Cream	91.1			
231	Strawberries with ice cream	Total sample	212.1	.15	200.5	19.3
232	Tart, strawberry	Total sample	90.6	.10	225.1	11.3
233	Toast, buttered	Total sample	73.3	.10	311.3	42.7
234	Toast, French, with maple cane syrup	Toast	111.6	.35	741.7	88.3
		Butter	20.0			
		Syrup	40.0			
235	Toast, milk	Total sample	229.0	.15	333.5	59.4
236	Tomatoes, sliced	Total sample	142.5	.15	32.2	6.7
237	Tomatoes, sliced with lettuce	Tomatoes	79.8	.20	52.1	8.2
		Lettuce	43.2			
238	Tomatoes and lettuce with dressing	Tomatoes	117.3	.20	57.4	12.5
		Lettuce	53.4			
		Dressing	11.6			
239	Veal cutlet, breaded, with tomato sauce	Breaded veal	133.3	.20	897.8	177.8
		Potatoes and gravy	152.7			
		Bread	61.8			
		Butter	20.0			
240	Veal pot pie with dumplings	Pie and dumplings	277.0	.15	568.0	153.2
		Bread and butter	73.6			
241	Watermelon, 2 orders	Edible portion	1,080.0	.30	244.3	27.6
242	Weakfish, baked, with dressing	Fish and dressing	179.6	.20	559.7	156.7
		Mashed potatoes	119.5			
		Bread and butter	68.7			

Bearing in mind the kaleidoscopic fluctuation in market values that have taken place since his words were written, the following comments by Professor Lusk on the additional tables dealing with the relative wholesale costs of food still hold good:

The Minimal Cost of Food

"The above are analyses of 350 different samples of foods purchased over the counters of a company which maintains a chain of restaurants in New York City, and obtained without knowledge on the part of these restaurants that the analyses were contemplated.

"One may reliably assume that for the man of ordinary size, who lives without doing any special muscular exercise, the fuel requirement of the body each day amounts to 2,500 calories of heat. Translated into common terms, this is the quantity of heat which would be required to raise about 25 quarts of water from the freezing to the boiling point. Miss Cauble, a special investigator of the Association for the Improvement of the Condition of the Poor, kindly estimated the cost at wholesale prices of the ingredients of different portions sold in the restaurants. The data enable one to construct a table which gives the estimated wholesale cost of 2,500 calories in the various

familiar forms of food sold in the restaurant. This represents the minimum cost of fuel for the support of an adult during twenty-four hours without taking into consideration labor, fuel or rent which, in the case of the restaurant, must be included in the cost of the foods when they are eaten. It represents the minimal cost of food in the home.

"It appears from the table given below that the cost of 2,500 calories in the wholesale market varies from $.04 in the case of boiled rice to $.61 for shad. About half of the dishes can be obtained at wholesale at a price less than $.25 for 2,500 calories, or less than a cent per hundred calories, a cost which is the standard striven for in school lunches. The table is given on the next page.

ESTIMATED WHOLESALE COST OF THE UNCOOKED INGREDIENTS OF 2500 CALORIES CONTAINED IN STANDARD FOODS ARRANGED ACCORDING TO THEIR INCREASING COST

Apple tapioca pudding	$.04
Rice, boiled (side order)	.04
Bath buns	.06
Pie, apple	.07
Pie, rhubarb	.08
Apple, baked	.09
Pie, strawberry	.09
Cocoa	.09
Crullers	.10
*Fish cakes with tomato sauce	.13
Muffins, corn	.13
*Lamb croquettes and mashed potatoes	.14
*Beans, Boston baked	.15
*Beef, corned	.15
Pie, Lemon	.15
Chicken wings on toast	.16
Napoleon	.16
*Salad, potato	.16
Toast, buttered	.16
Cream roll	.17
*Beef, creamed, chipped, on toast	.18
Cakes, butter	.19
*Roast, Vienna, and spaghetti and potatoes	.19
Pudding, tapioca, creamed	.20
Sandwich, oyster	.20
*Veal cutlet, breaded and tomato sauce	.20
*Beef, corned, hash browned in pan	.21
*Liver and bacon	.21
*Roast, Vienna, with French fried potatoes	.21
*Stew, lamb	.21
*Beans, New York, baked	.22
Cakes, buckwheat, with maple cane sirup	.22
Coffee, cup of (contained cream and sugar)	.22
Pudding, bread, with vanilla sauce	.24
*Beef, corned, hashed, steamed	.25
Oatmeal, fresh cooked, with cream	.25
*Stew, beef	.25
Pie, oyster	.26
Potatoes, French fried, extra order	.26
*Sandwich, ham	.26
*Beef, creamed, chipped	.27
*Sandwich, corned beef	.27
*Beef, corned, hashed, steamed, with poached egg	.28
*Mackerel, broiled salt, with mashed potatoes	.28
Milk	.29

STIMATED WHOLESALE COST OF THE UNCOOKED INGREDIENTS OF 2500 CALORIES CONTAINED IN STANDARD FOODS ARRANGED ACCORDING TO THEIR INCREASING COST (Continued)

idding, rice, cold	$.29
ce, hot, with poached egg	.29
up, bean, with croutons	.29
ndwich, minced chicken	.30
rnstarch, chocolate, with cream	.31
e cream, strawberry	.31
nelet, ham	.32
ndwich, cream cheese walnut	.32
nelet, plain	.33
rnstarch, vanilla, with cream	.34
nelet, onion	.34
ster fry, small	.34
gs, fried (2)	.35
ndwich, fried egg	.35
usage, country	.35
icken croquette and French fried potatoes	.36
gs, creamed, on toast	.36
nelet, parsley	.37
nelet, Spanish, with French fried potatoes	.37
ndwich, tomato	.39
gs, scrambled (2)	.40
mb chops (2)	.40
ndwich, club	.40
lad, tuna fish	.41
stard	.43
ndwich, chicken, sliced	.43
eak, tenderloin	.43
m, fried	.44
ndwich, roast beef, hot	.44
rawberries with cream	.44
ast milk	.45
gs, boiled (2)	.47
nelet, chicken	.47
ndwich, minced chicken with lettuce	.49
gs, poached on toast (2)	.59
ad, baked, and dressing	.61

These orders contained bread and butter, which are figured he food values. Of the orders containing bread the fracal part of the nutritional energy of the order from this ce averaged 43.7 per cent. of the total.

"Contemplation of these results may b made after the housekeeper has carefull gone through the monthly bills for food, di vided the cost of the total food by the num ber of days in the month and then divide this figure by the number of people in th family, counting children between five an fifteen years of age at two-thirds of a adult.

"It would be interesting to know whethe the cost of food for the adult as determine in this fashion was $.25, $.50 or $1.00 pe day. Wherever the higher values ar reached it is certain that extravagant profit are paid to middlemen or great waste ex ists in the kitchen.

"The theme might still further be elab orated, but the essential data for those in terested in food economics can be obtaine from the table itself. Wholesale prices ar used for the reason that retail prices ar subject to great variation." The fluctuatio of retail prices does not make it feasible t give their equivalents for the wholesale lis but the relationship can be judged by notin the equivalents for the extremes. In thi table, for example, the retail price of 2,50 calories of rice would be about 13 cents a against 4 cents wholesale, and for sha

ut $1.50 retail, as against 61 cents whole-
e.

These costs have, of course, greatly in-
ased in many instances during the war.
e difficulty of presenting figures not sub-
t to modification before they appear in
nt has led the author to leave these basic
res for the student to adjust according
current market conditions.

The extent of these fluctuations is shown
the following tables, compiled by the U. S.
reau of Labor Statistics.

RELATIVE RETAIL PRICES OF FOOD IN THE UNITED STATES, JANUARY 15, 1913, TO JUNE 15, 1918, INCLUSIVE

Average price for the year 1913=100

(Monthly Review of the U. S. Bureau of Labor Statistics)

Month	1913	1914	1915	1916	1917	1918
Average for year...	100	102	101	114	146	
January..........	98	104	103	107	128	160
February.........	97	101	101	106	133	161
March............	97	99	98	107	133	154
April............	98	97	99	109	145	154
May..............	97	98	100	109	151	158
June.............	98	99	100	112	152	162
July.............	100	102	100	111	146	167
August...........	101	107	100	113	149	171
September........	102	107	101	118	153	178
October..........	104	105	103	121	157	181
November.........	105	105	104	126	155	183
December.........	104	105	105	126	157	187

RELATIVE RETAIL PRICES OF SELECTED ARTICLES OF FOOD IN THE UNITED STATES, 1913-1918

Average price for the year 1913=100

(Monthly Review of the U. S. Bureau of Labor Statistics)

Article	Average price for the year					Aver. prices, Jan.15-June 15,191					
	1913	1914	1915	1916	1917	Jan.	Feb.	Mar.	April	May	Ju
Sirloin steak..	100	102	101	108	124	129	131	133	144	157	[illegible]
Round steak..	100	106	103	110	130	137	141	143	155	170	[illegible]
Rib roast....	100	103	101	107	126	130	133	135	148	161	[illegible]
Pork chops...	100	105	96	108	152	163	160	161	170	175	[illegible]
Bacon.......	100	102	100	106	152	180	179	181	183	187	[illegible]
Ham........	100	102	97	109	142	162	163	164	166	170	[illegible]
Lard........	100	99	93	111	175	208	209	210	209	208	[illegible]
Hens........	100	102	97	111	134	154	170	*a*	*a*	178	[illegible]
Eggs........	100	102	99	109	139	195	177	128	123	123	[illegible]
Butter.......	100	94	93	103	127	148	151	144	132	133	[illegible]
Milk........	100	100	99	102	125	151	151	151	148	148	[illegible]
Flour........	100	104	126	135	211	200	200	200	200	200	[illegible]
Corn meal....	100	105	108	113	192	233	233	240	237	233	[illegible]
Potatoes.....	100	108	89	155	253	188	188	147	129	129	[illegible]
Sugar.......	100	108	120	146	169	173	193	167	165	165	[illegible]
All articles combined..	100	102	101	114	146	160	161	154	154	158	[illegible]

a Conforming to the ruling of the United States Food Admin-istration, no live or fresh hens were sold.

The following table shows how much food measured in calories is consumed by men d women in different occupations:

CALORIES OF FOOD CONSUMED DAILY *

The following table is derived from data produced by Becker and Hamalainen the University of Helsingfors, Finland, from actual experiment with indiduals alternately resting and working at their respective trades while in the espiration calorimeter."

Occupation	Age	Height Ft.-Ins.	Wgt. Lbs.	During Rest		During Work	Total Calories per Day (8 Hrs. Work, 16 Hrs. Rest)
				Calories per Hour	Calories per Hour per Lb. of Body Weight	Calories per Hour	
MEN							
oemaker........	56	5–0	145	73	.50	172	2544
oemaker........	30	5–8	143	87	.60	171	2760
ilor............	39	5–5	141	72	.50	124	2144
ilor............	46	5–10½	161	102	.63	135	2712
okbinder.......	19	6–0	150	87	.58	164	2704
okbinder.......	23	5–4½	143	85	.59	163	2664
etal Worker.....	34	5–4	139	81	.58	216	3024
etal Worker.....	27	5–5	130	99	.76	219	3336
inter..........	25	5–11	154	104	.67	231	3512
inter..........	27	5–8	147	111	.79	230	3616
ner............	42	5–7	154	81	.50	204	2928
ner............	24	5–5½	141	85	.60	244	3312
ne-worker......	27	5–11	156	90	.57	408	4704
ne-worker......	22	5–8	141	85	.60	366	4288
vyer...........	42	5–5	167	86	.50	501	5384
vyer...........	43	5–5	143	84	.59	451	4952
WOMEN							
nd-sewer.......	53	5–3	139	75	.54	83	1864
nd-sewer.......	35	5–6	143	64	.45	88	1728
chine-sewer.....	53	5–3	139	75	.54	103	2024
chine-sewer.....	19	5–3	110	64	.58	119	1976
sh-woman......	43	5–3	125	75	.60	285	3480
sh-woman......	19	5–3	110	64	.58	186	2512
itress..........	43	5–3	125	75	.60	228	3024
itress..........	19	5–3	110	64	.58	143	2168
kbinder.......	22	5–4	105	70	.65	98	1904
kbinder.......	22	5–3	112	61	.54	127	1992

Skandinavisches Archiv für Physiologie XXXI. Band. 1., 2 u., 3. Heft, Leip- Verlag Von Veit & Comp., 1914.

In these tables it will be noted that fo sawyers (an active occupation), the hea production and consequent requirement i calories worked out as follows:

During rest	84 calories per h. × 16 h.	....	1344
During work	451 calories per h. × 8 h.	....	3608
	Total calories	....	4952

The tailor (sedentary occupation) showe the following heat production and calorifi requirement:

72 calories × 16 h.	1152
124 calories × 8 h.	992
Total calories	2144

These figures show the wide variation i food requirements according to age, weigh and occupation.

Using these figures as a basis, Professo Lusk gives the following values for th soldier:

Sleeping 8 hours at 70 calories per hour	560	calori
Resting in camp 6 hours at 77 calories per hour	462	"
*Hike of 30 miles, 10 hours at 300 calories per hour	3000	"
Total	4022	"

As applied to the requirements of a

*Forced march. Ordinary march is 15 miles.

linary family, Professor Lusk gives the lowing figures:

	Calories per day
Father	3000
Mother	2500
Boy of 13	3000
Boy or girl of 11	2500
Boy or girl of 9	2500
Boy or girl of 7	2100
	15600
Add 10% for waste	1560
Family requirement	17160

Ϊhis is the equivalent of food for 5⅕ men ng an average day's work.

If the father does the hardest kind of ysical labor 1,000 calories per day may added. If the father be over six feet 300 calories are needed in addition.

Basal Metabolism

Francis G. Benedict and his co-workers at Nutrition Laboratory of the Carnegie Inution of Washington, and Professor Lusk, e also made a large number of experiits to ascertain what is termed the basal abolism or heat production of the body perfect rest, and also that under varying rees of activity. The results are closely greement with the above.

enedict has lately produced evidence to w that the basal metabolism, or heat proion, at rest is not governed entirely by

such factors as body weight and body surface but by the amount and activity of the activ protoplasmic cells of the body—the cells tha compose the organs and muscles and blood The condition of these cells when the meas urements are taken (which may be influence by age, sleep, previous muscular exercise an diet) materially affects the amount of hea production and the requirements in energ food. Such experiments show why a ma must literally burn up his own body, if h takes in no fuel in the form of food. Bene dict's views also account for the highe energy requirement of men as compared t women, who, as a rule, have more fat an less muscular tissue than men.

The fuel values of these extra foods c indulgences have been worked out by Co nelia G. Benedict and Francis G. Benedi at the Nutrition Laboratory of the Carneg Institution. They are astonishingly high a should be borne in mind by all who wish avoid food waste and excess nutrition:

	Calories for 1
Walter Baker, Vanilla Sweet Chocolate	629
Park & Tilford Chocolate	641
Stollwerck Chocolate	490
Milk Chocolate	220–460
Nut Chocolate	157–524

SODA WATERS

Ice Cream (with Cream)

	Calories	Cost Cents
Chocolate, chocolate ice-cream.....	443–467	15
Chocolate, chocolate ice-cream.....	251–377	10
Chocolate, vanilla ice-cream.......	314–374	10
Fresh strawberry, vanilla ice-cream	436	15
Vanilla, vanilla ice-cream.........	394–399	15
Vanilla, vanilla ice-cream.........	202–385	10

SODA WATERS

Plain

Chocolate	172–268	5
Vanilla	239	5

With Cream

Chocolate	357	10
Chocolate	109-247	5
Vanilla	134–230	5
Vanilla	167	10

Sundaes

	Calories	Cost Cents
Chocolate Ice-Cream:		
Chocolate sauce, walnuts.........	327–516	15
Fudge sauce, walnuts.............	412	20
Marshmallow sauce, walnuts.......	383	15
Marshmallow and chocolate sauce, walnuts	429	15
Maple walnut sauce...............	235	10
Strawberry sauce.................	225–235	10
Strawberry Ice-Cream:		
Fresh strawberry sauce...........	277–406	15
Strawberry sauce.................	257	15
Strawberry sauce and marshmallow.	412	15
Vanilla Ice-Cream:		
Fresh strawberry sauce...........	334	15
Marshmallow sauce, walnuts.......	350	20
Cnocolate sauce, walnuts.........	396	15
Marshmallow sauce................	251	15
Cnocolate sauce, nuts............	371	15
Strawberry sauce.................	304	15

Temperance or "Soft" Drinks

	Contents Claimed	Calories	Cost Cents
Ginger ale......	15½ oz.	136	20
Grape juice.....	1 pint	308	22
Moxie..........	1 pint, 10 oz.	322	20

Diet and Endurance

We have quoted Rubner (*vide* page 38) as condemning the very old popular idea that meat is very "strengthening." Actual experiments on this point have shown exactly the opposite to be the case. Meat eating and a high-protein diet instead of increasing one's endurance, have been shown, like alcohol, actually to reduce it.

An experiment was made by one of the authors to determine this question. The experiment consisted of endurance tests made on 49 persons representing the two types of dietic habits. The persons experimented upon constituted three classes: first, athletes accustomed to high-protein and full-flesh dietary; second, athletes accustomed to a low-protein and non-flesh dietary; third, sedentary persons accustomed to a low-protein and non-flesh dietary. The subjects consisted of Yale students and instructors, a Connecticut physician, and several other physicians and nurses. All of the low-protein and non-flesh subjects, except one, had abstained from flesh foods for periods of 4 to 20 years, and 5 of them had never eaten such foods.

The experiments furnished a severe test of the claims of the flesh-abstainers. Two comparisons were planned, one between

lesh-eating athletes and flesh-abstaining athletes, and the other between flesh-eating athletes and flesh-abstaining sedentary workers. The results would indicate that he users of low-protein and the non-flesh lietaries have far greater endurance than hose who are accustomed to the ordinary American diet.

In the absence of any exact mechanical nethod of measuring endurance, simple endurance tests were employed, such as folding the arms horizontally as long as possible and deep knee bending. The tests were nade before witnesses.

The comparison for arm holding shows a great superiority on the side of the flesh-abstainers. Only 2 of the 15 flesh-eaters taking this test succeeded in holding their arms out over a quarter of an hour, whereas 22 of he 32 abstainers surpassed that limit. None of the flesh-eaters reached half an hour, but 15 of the 32 abstainers exceeded that limit. Of these 9 exceeded an hour, 4 exceeded 2 hours and 1 exceeded 3 hours.

In respect to deep knee bending, if we take the number 325 for reference, we find that, of the 9 flesh-eaters taking this test only 3 surpassed this figure, while of the 21 abstainers, 17 surpassed it. Only 1 of the

9 flesh-eaters reached 1,000 as against 6 of the 21 abstainers. None of the former surpassed 2,000 as against 2 of the latter.

Similar results have been found in other investigations. It is probable that the inferiority of meat-eaters in staying power is due primarily to high protein, not to meat *per se*.

In 1906, nine Yale students under the direction of one of the authors experimented with Mr. Horace Fletcher's method of thorough mastication and instinctive eating. The experiment began with an endurance test on January 14, and consisted mainly of two parts, each of which lasted about ten weeks.

The object of the first half of the experiment was to test the claims which have been made as to the effects upon endurance of thorough mastication combined with implicit obedience to appetite. Our conclusion in brief is that these claims, so far as they relate to endurance, are justified.

The method may be briefly exprest in two rules.

1. *Mastication.*—Thorough mastication of all food up to the point of involuntary swallowing, with the attention directed, however, not on the mechanical act of chewing, but on

he tasting and enjoyment of the food; liquid oods to be sipped and tasted, not drunk lown like water. There should be no artiicial holding of food in the mouth beyond he time of natural swallowing, even if, as s to be expected at the start, swallowng is premature. It is not intended to 'count the chews,'' or to hold the food orcibly in the front of the mouth, or to llow the tongue muscles to become fatigued y any unnatural effort or position, or in ny other way to make eating a bore. On he contrary, every such effort distracts one rom the natural enjoyment of food. Pavlov as shown that without such attention and njoyment of the taste of food, the secretion f gastric juice is lessened. The point of inoluntary swallowing is thus a variable oint, gradually coming later and later as he practise of thorough mastication proeeds, until the result is reached that the ood remains in the mouth without effort nd becomes practically tasteless. Thus the ood, so to speak, swallows itself, and the erson eats without thought either of swalowing or of not swallowing it; swallowing s put into the same category of physiological unctions as breathing, which ordinarily is nvoluntary.

2. *Following instinct.*—Never to eat when not hungry, even if a meal (or more than one, for that matter) is skipped, and when a meal is taken, not to be guided by the quantity of food offered, or by past habit, or by any theories as to the amount of food needed. The natural taste or appetite is alone consulted, and the subject selects, from the food available, only those kinds and amounts which are actually craved by the appetite. After practise, the appetite gradually becomes more definite and discriminating in its indications.

During the second half of the experiment the two rules above mentioned were continued in force, but a third rule was added, namely, when the appetite was in doubt, to give the benefit of that doubt to low-protein and non-flesh foods. In other words, the influence of suggestion was invoked to hasten the change which had been inaugurated by arousing the natural appetite. Suggestion was introduced merely because the experiment was limited in time. In no case was it allowed to override the dictates of appetite.

Careful records of the amount of food taken and the constituents in (1) protein, (2) fats and (3) starches and sugars, were kept for each man for each day. In order

to avoid weighing the food at the table and the annoyance which such a procedure involves, the food was all weighed in the kitchen and served in definite portions of known food value. From the records thus supplied, it was easy, by means of a "mechanical diet indicator" devised for the purpose, to find the proportions of food elements. The first result of the experiment was a reduction in the amount of protein consumed.

During the first four weeks, the men consumed an average of from 2,760 to 3,030 calories per day, of which 120 to 240 were in the flesh foods, such as meats, poultry, fish and shell-fish, and that 2.4 to 2.7 calories of protein were ingested for each pound of body-weight. Translating Professor Chittenden's figures for the physiological requirement of ingested protein, we find it to be from 1.3 to 1.7 calories per pound of body-weight. Thus the men were at this time consuming nearly double the Chittenden allowance. During the last four weeks of the experiment all these magnitudes were lower. The per capita calories ranged from 2,220 to 2,620, of which only 40 were in flesh foods, and the protein had fallen to 1.4 to 1.9 calories per pound of body-weight, which

corresponds closely to the Chittenden standard.

Gymnasium tests were made at the beginning, middle and end of the experiment. These tests were of two kinds—tests of strength and tests of endurance.

During the first period there was a slight increase in strength (from an average "total" strength of 1,076 to 1,118), and during the second period a slight fall to 995, which is about 12 per cent. from the mid-year's 1,118, and about 8 per cent. from the original 1,076. Thus the strength of the men remained nearly stationary throughout the experiment.

It is fortunate that the strength of the men remained so nearly stationary; for it demonstrates the more clearly that the increase in endurance which will be shown below was an increase in endurance *per se*, and not in any degree due to an increase in strength. Strength and endurance are entirely distinct and should be separately measured. The strength of a muscle is measured by the utmost force which it can exert *once;* its endurance by the number of times it can repeat a given exertion *well within its strength.*

After much consideration and consultation

was decided not to place reliance on the dinary ergographs as a means of measur-g endurance. Instead, seven simple mnastic tests of physical endurance were ployed, and one of mental endurance. ie seven physical tests were:

(1) Rising on the toes as many times as ssible.

(2) Deep knee bending, or squatting as r as possible and rising to the standing sture, repeating as often as possible.

(3) While lying on the back, raising the ;s from the floor to a vertical position and vering them again, repeating to the point physical exhaustion.

(4) Raising a 5-lb. dumb-bell (with the ceps) in each hand from the shoulder up the highest point above the head, repeat-; to the point of physical exhaustion.

(5) Holding the arms from the sides hori-ıtally for as long a time as possible.

(6) Raising a dumb-bell (with the biceps) one hand from a position in which the n hangs down, up to the shoulder and vering it again, repeating the motion to point of physical exhaustion. This test s taken with four successive dumb-bells decreasing weight, *viz.*, 50, 25, 10 and 5 . respectively.

(7) Running on the gymnasium track at speed to suit the subject, to as great a di tance as possible.

The mental test consisted of adding spe fied columns of figures as rapidly as possib the object being to find out whether t rapidity of performing such work tended improve during the experiment.

The following table summarizes the resul for eight of the nine men. It shows for i stance that B. improved in physical e durance 33 per cent., *i.e.*, more than 33 p cent. between January and March and mo than 84 per cent. between January and Jun

PERCENTAGE OF IMPROVEMENT IN PHYSICAL ENDU ANCE (EXACT OR UNDERSTATED) OF EIGHT MEN

AVERAGE

	B	Lq	Lw	M	P	R	T	W
Jan.-Mar.	33+	36	50	—	26	18+	66+	33
Jan.-June	84+	84+	181	29	56+	89+	80+	107

The above figures show an undoubted i crease in endurance, both for the first ha and more especially for the whole period the experiment.

Three methods of estimating the increa of endurance between January and Ju were used. The above table gives the sa minimum estimates.

We are quite safe in saying, therefor

t the average improvement of the eight
a who improved was 90 per cent.

'he ninth man failed to improve but re-
gressed slightly. He served as a "con-
l," being the one man out of the nine
ɔ did not follow out the conditions of the
eriment as to thorough mastication and
nge of diet.

'he phenomena observed during the ex-
iment may be summarized as a slight re-
tion of total food consumed, a large re-
tion of the protein element, especially of
h foods, a lessened excretion of nitrogen,
eduction in the odor, putrefaction, fer-
ntation and quantity of the feces, a slight
s of weight, a slight loss of strength, an
rmous increase of physical endurance, a
ht increase in mental quickness. These
nomena varied somewhat with different
ividuals, the variations corresponding in
eral to the varying degree in which the
a adhered to the rules of the experiment.

'hat we are correct in ascribing the re-
ts, especially in endurance, to dietetic
ses alone, can not reasonably be doubted
en it is considered that no other factors
known significance were allowed to aid in
s result.

Vhile the results of the present experi-

ment lean toward "vegetarianism," they ar
only incidentally related to its propaganda
Meat was by no means excluded; on the con
trary, the subjects were urged to eat it i
their appetite distinctly preferred it t
other foods.

The sudden and complete exclusion c
meat is not always desirable, unless mor
skill and knowledge in food matters are em
ployed than most persons possess. On th
contrary, disaster has repeatedly overtake
many who have made this attempt. Pavlo
has shown that meat greatly stimulates th
flow of gastric juice. Whether the stimulu
it gives to the stomach is natural, or in th
nature of an improper goad or whip, certai
it is that some stomachs which are accus
tomed to this daily whip have failed, for
time at least, to function satisfactorily whe
it was withdrawn.

Nor is it necessary that meat should b
permanently abjured, even when it ceases t
become a daily necessity. The safer cours
at least, is to indulge the craving wheneve
one is "meat hungry," even if, as in man
cases, this be not oftener than once in severa
months. The rule of selection employed i
the experiment was merely to *give the bene
fit of the doubt* to the non-flesh food; bu

n a *slight* preference for flesh foods was
pe followed.

Ve have presented these facts largely as
aatter of historic interest.

'he high protein tradition has ceased to
ipy the minds of physiologists altho it
. had a firm hold when this book was
t issued in 1915. Probably Professor
nzo E. Taylor's observations on the Ger-
ı experience did much to change this
lition and confirm the early views of
ttenden and others.

; has been stated that the Chittenden
and Hindenburg strategy were winning
war for Germany. This might now be
lified to read that they were instrumental
postponing Germany's defeat, but that
tenden and other physiologists have
e helped our Food Administration and
Army to make possible the crushing de-
of Germany.

ı a general way the experiments of
ncis G. Benedict carried on in 1918 with
et squad on a low protein and low calory
. have confirmed the findings in these
s with regard to the endurance of indi-
als who are on a low protein allowance.
n the low calory allowance, equal to only
ıt two-thirds the usual requirement for

age, weight and activity, did not apparen impair the endurance of these men, altho we have elsewhere stated, under the combi low calory and low protein diet the excess nitrogen loss apparently withdrew a cert stimulus to cellular activity as noted in l blood pressure, low pulse rate and lack of called "pep." As elsewhere pointed out, caution is given by Benedict that there danger in a low protein diet that is also l in calories because of the withdrawal fr the tissues of reserve nitrogen.

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SECTION II

OVERWEIGHT

How many people after age 35 have a con-
rmation of body that is in accord with
oper ideals of health and symmetry? The
erage individual, as age progresses, gains
eight until he reaches old age, when the
eight usually decreases.

This movement of weight is so universal
at it has been accepted as normal, or
ysiological, whereas it is not normal, and
the result of disease-producing and life-
ortening influences.

The standards for weight at the various
es and heights have been established by
e insurance experience, but these stand-
ds, which show an increase in weight as
e advances, by no means reflect the stand-
ds of health and efficiency. They merely
licate the average condition of people ac-
oted for life insurance, whose death-rate
while covered by life insurance premiums
s yet far above that obtaining among peo-
of the best physical type, who live a
oroughly hygienic life.

The attached charts tell the story of overweight and underweight.

It seems reasonable to deduce from these figures that the usual gain in weight with advancing years is not an advantage but a handicap. We should endeavor to keep our weight at approximately the average weight for age 30, the period of full maturity, as experience shows that those so proportioned exhibit the most favorable mortality.

The weight of men's and women's clothing has been carefully investigated by the Institute. The following figures will enable one to adjust the tables derived from life insurance records for nude weight or seasonable variations:

AVERAGE WEIGHT OF CLOTHING (MALES)

COAT AND VEST

	Tropical	Mid-Summer	Winter
Small	1 lb. 3¾ oz.	2 lbs. 1½ oz.	2 lbs. 8¼ oz.
Medium	1 lb. 5 oz.	2 lbs. 4½ oz.	2 lbs. 11¼ oz.
Large	1 lb. 8 oz.	2 lbs. 9 oz.	3 lbs. 1 oz.

ALL OTHER CLOTHING INCLUDING SHOES

	Tropical	Mid-Summer	Winter
Small	2 lbs. 8 oz.	2 lbs. 9 oz.	5 lbs. 9¼ oz.
Medium	3 lbs. 11 oz.	4 lbs. 11 oz.	5 lbs. 14 oz.
Large	4 lbs. 1 oz.	5 lbs. 1 oz.	6 lbs. 4 oz.

AVERAGE WEIGHT FOR ALL SEASONS

COAT AND VEST

Small	1 lb. 15 oz.
Medium	2 lbs. 1⅔ oz.
Large	2 lbs. 6 oz.

ALL OTHER CLOTHING INCLUDING SHOES

Small	4 lbs. 3⅓ oz.
Medium	4 lbs. 12 oz.
Large	5 lbs. 2 oz.

AVERAGE WEIGHT OF CLOTHING (WOMEN)

DRESSES AND CORSETS

	Tropical	Mid-Summer	Winter
all	1 lb. 11 oz.	2 lbs. 8 oz.	2 lbs. 11 oz.
dium	1 lb. 14 oz.	2 lbs. 12 oz.	2 lbs. 15 oz.
rge	2 lbs. 4 oz.	2 lbs. 15 oz.	3 lbs. 5 oz.

ALL OTHER CLOTHING INCLUDING SHOES

	Tropical	Mid-Summer	Winter
all	1 lb. 15 oz.	2 lbs. 10 oz.	3 lbs. 6 oz.
dium	2 lbs. 1 oz.	2 lbs. 12 oz.	3 lbs. 8 oz.
rge	2 lbs. 12 oz.	3 lbs. 6 oz.	4 lbs. 6 oz.

AVERAGE WEIGHT FOR ALL SEASONS

DRESSES AND CORSETS

Small	2 lbs. 4⅔ oz.
Medium	2 lbs. 8⅔ oz.
Large	2 lbs. 13⅓ oz.

ALL OTHER CLOTHING INCLUDING SHOES

Small	2 lbs. 10⅓ oz.
Medium	2 lbs. 12⅓ oz.
Large	3 lbs. 8 oz.

In fat people, the number of working cells relatively less in proportion to the weight an in thin people, as fat cells do not work. so, there is less body surface exposed in oportion to the body weight, and consquently less heat loss. Likewise, fat peo- are less active, and their little cellgines do not call for so much fuel; consquently fat people do not use as much od as lean or muscular people of the same ight. This explains, as already remarked, y women do not need as much food as

men of the same weight. But often the fu
is furnished to the fat man and woma
right along in the ordinary diet, so tha
what is not burned up is stored up and th
person grows stouter and stouter.

Diet for Overweight

For extreme overweight, diet should b
prescribed accurately by the physician t
suit the needs of each individual case. Ce
tain general principles may be stated, how
ever, as applicable to the average case.

It is surprizing what an enormous fu
value certain foods have which are eate
very carelessly, and what a very low fu
value others have which are quite satisfyin
to hunger. For example: One would hav
to eat $9.00 worth of lettuce and tomat
salad to furnish 2,500 calories, the amou
of fuel for the day's requirements (Lusk
while about 30 cents' worth of butter, or 1
cents' worth of sugar would furnish th
same amount of energy. No one woul
think of feeding exclusively on any one c
these foods, but it is easy to see how th
elimination of butter and sugar and the i
troduction of such foods as lettuce, toma
toes, celery, carrots, spinach and fruits, a
of which have a low fuel value, woul
enormously reduce the available energy an
therefore the fat-forming elements in th

diet, yet fill the stomach and satisfy the hunger-craving. Hunger is largely dependent upon the contractions of the empty stomach and not upon a general bodily craving for food.

Fat Forming Foods That Should, as a Rule, be Avoided by Overweights

Foods which should be reduced in quantities or avoided, in cases of overweight, are sugar, fats, milk as a beverage, salmon, lobster, crabs, sardines, herring, mackerel, pork and goose, fat meats, nuts, butter, cream, olive oil, pastry and sweets. Water t meals. Alcohol which is not properly peaking a food, altho often so called, should avoided, as it is a fuel. It is good to burn a stove, but not in the human body.

Exercise for Overweight

—Walking, swimming, golf, billiards, hill-ıbing, are all beneficial forms of exercise the middle-aged and elderly, who are efly affected by overweight.

Irksome and monotonous forms of exercise, while difficult to follow regularly, are usually of more benefit, as they are less likely to create an appetite. Simple exercises, if repeated from twenty to forty times, night and morning, will accomplish much. No apparatus is required, and any movements that bring into play the entire muscular system, and especially the muscles of the trunk, with deep breathing, are suffi-

cient.* The main reliance should be upon dietetic regulation rather than upon exercise. A very moderate increase of exercise and a persistent adherence to a proper diet will work wonders in weight reduction.

Avoidance of Sudden Reduction

It is unwise to attempt a sudden reduction in weight. Profound nervous depression may be caused by too rapid reduction in people of nervous temperament, especially if they have long been overweight. By gradually modifying the diet and moderately increasing the exercise, the results can be obtained with mathematical precision and without undue hardship. It may be necessary to fore- certain pet dietetic indulgences, but such indulgences are, after all, a mere matter habit and a liking for new forms of food can usually be acquired. One can not have the cake and penny too. One can not safely reduce one's weight by any mysterious method that will leave one at liberty to continue the indulgences, whether of sloth or of appetite, that are responsible for its accumulation.

Summary

The reduction of weight is really a very simple matter. No mysterious or elaborate "systems" or drugs are needed.

If a sufficient reduction in the amount of energy food and an increase in the amount

* See "Setting-up" exercises described in the SUPPLEMENTARY "Notes on Posture."

of exercise are made, no power on earth can prevent a reduction in weight.

The rule of safety, however, for those really "fat" is to reduce by diet before attempting any vigorous exercise as there is grave danger to fat people from overstrain of a fat-embarrassed heart.

Even a sedentary worker uses up about 2,500 calories a day. By reducing the food to 1,200 calories (this can be done without decreasing its bulk) and increasing the exercise to the point of burning up 3,000 calories, the tissues are drawn upon for the difference, and a reduction in weight must be experienced just as surely as a reduction in a bank account is made by drawing checks on it.

From the following simple dietary an overweight who has no serious organic disease can bring down the diet as low as 1,500 calories, forcing the body to contribute about 1,000 calories daily of its own fat.

Breakfast

Apple, small orange, or ½ grapefruit, one or two eggs, thin toast, dry or very lightly buttered; coffee, with hot milk instead of cream, not more than one lump sugar.

Luncheon

Vegetable soup (no creamed soups), rye bread, bran bread or bran biscuit, or graham rolls—thinly buttered (one small pat only), lettuce and cheese salad, or lettuce and tomato, or fruit salad, French dressing.

Dinner

Moderate helping of any roast of lea meat or non-fat poultry or fish, baked o boiled potato, any bulky vegetable (as lettuce, Swiss chard, parsnips, carrots, turnips celery, oyster plant, cabbage, Brusse sprouts, tomatoes, Spanish onions, spinac coffee, fruit dessert—grapefruit cockta oranges, or stewed fruits.

Exercise should, of course, be followe for its other beneficial effects as well as for weight reduction.

Where there is pronounced overweight it is well to weigh every few days in order to note the effect of the diet. It is a very simple matter to ease up on the fuel foods, substituting fruits and vegetables, and follow the effect of the diet by charting your weight on a blank provided for this purpose.* There should be no effort at rapid reduction but try and get off a few pounds each week.

* Weight tables and blanks for charting weight can be ha of the Institute, price 10c.

The careful chewing, or rather tasting, of food until it naturally slides into the stomach will often tend to prevent overeating.

Underweight

Diet for Underweight

Thin people lose heat more readily than stout people, as they have a larger percentage of active tissue and expose more skin surface in proportion to the body weight. They require, therefore, an abundant supply of energy food, or fuel foods, fats, starch and sugar. Butter and olive oil are [illegible]er than other fats and less likely to disturb the digestion. Sugar is a valuable fuel food, but should not be taken in concentrated form into an empty stomach. Sweets are best taken at the end of a meal, but in such cases the teeth should be well cleansed. Fruit at the end of a meal tends to prevent any injury to the teeth from sugar and starches.

The problem is to secure the largest number of calories in the most digestible form. The following dietary will furnish about [illegible]50 calories, while the requirement of the average individual of very moderate activity is only 2,400 to 2,500 calories; hence, if this menu is faithfully followed and well di-

gested, an improvement in weight is almos certain to result:

Breakfast

Grape juice, 1 cup; farina with 4 dates 3/4 cup; scrambled egg, 1/2 cup; toast, slice; butter, 1/2 tablespoon; cream, thin, cup; sugar, 2 tablespoons (scant).

Luncheon

Creamed chicken (1/2 cup), on toast slice); lettuce salad, 1 serving; saltines, saltines; vanilla ice cream, 1/2 cup; ch olate, 5/6 cup.

Dinner

Cream of corn soup, 1 cup; roast b 2 1/2 slices; baked potato, 1 medium; butte lima beans, 3/8 cup; whole wheat bread, slices; butter, 2 tablespoons; baked apple, large; cream, thin, 1/2 cup; sugar, 1 tabl spoon (scant).

Egg lemonade, using several yolks to th glass, has a high fuel value, and is also hel ful in anemia. A fattening mixture can made of one quart of milk to which is adde several ounces of cream and several ounces milk sugar. This can be taken as a beverag at each meal and forms a very substanti foundation to the whole dietary. Salad may be used freely in dressings.

While it is, of course, extremely important o get as many calories as possible, it is lso necessary to include plenty of green egetables, fruits and raw foods in order at the regulating elements may be supied in addition to the fuel.

Overfatigue and exhausting physical exeron should be avoided.

Exercise for Underweight

Moderate systematic exercises, with deep eathing, and sleeping out of doors, or aproaching as near to it as one can, are adable. At middle life and after, underht, unless extreme or accompanied by ence of impaired health, should not give concern. Other things being equal, the motto, "A lean horse for a long race," ds good.

This is well shown in the mortality charts ere even being 50 pounds under the avere weight in elderly life seems to be an vantage.

Courtesy of Major R. Tunstall Taylor of Army Medical Museu

HOW DO YOU STAND?

This picture shows the correct standing position, feet parall
The weight-bearing line passes through the kneecap, shin, an
and between the second and third toes. No one can view t
picture without a sense of pride and comfort. It is with su
men—millions of them—that we won this war. We are n
going to crush many of the unhygienic living habits and pr
tices that may menace the future of the nation quite as seriou
as Kultur and Prussianism.

SECTION III

POSTURE

Corrective Exercises for Faulty Posture

CORRECT posture is well exhibited in the cture on the opposite page. Note the rallel relationship of feet, toes pointing raight forward.

This correct posture may be described as llows: "Stand erect with heels about 6 hes apart and toes directed straight ford. Imagine that you are pushing some sting object with your chest. Your body then be in proper posture; that is, your will be in, your chest arched forward, ur neck perpendicular and well stretched, ur arms hanging by their own weight ng the middle line of the hips."

There is much claptrap charlatanry and eudo-science surrounding the subject of ercise and so-called physical culture. ere is really no mystery about exercise uirements and the many "marvelous" tems really owe such merit as they poss chiefly to the muscular movement that y require, the arousing the individual to vity, and often there is a psychic effect

as in all cases where hope of benefit is held out to the seeker after health.

The following exercises are drawn from many sources. They have no peculiar virt except that they cause the student to use hi muscles and they provide for proper co ordination in the muscular movements a for symmetrical development.

No system can claim a monopoly of idea of completely using the muscular r chinery of the body, and these exercis drawn from life by our artist simply sh convenient forms of exercise that bring play the whole muscular machinery o body.

from their lives and when they return to civil life they will insist upon having the proper footwear. It is to be hoped that this tremendous object lesson, together with the manufacturing need to supply the demand for proper shoes, will result in crowding out of the market the ordinary conventional shoe for men.

The problem with our girls and women is more difficult. With the foot conscience of the men thoroughly aroused, they will take notice more attentively of the foot deficiencies and the foot monstrosities of the women. The ridiculous pin-point shoe with the inevitable resulting deformity, the large joint protuberances, the corns and foot horrors that every self-respecting woman ought to eliminate from her physique, will be painfully apparent and jar the nerves of men who know what is what in feet. Whether such considerations will have any influence with our girls and women, time will tell. We leave this problem with them to work out with those mysterious agencies and influences that govern their fashions.

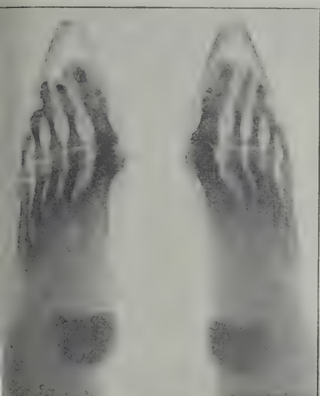
In order to assist them in solving this problem, we exhibit, through courtesy of Major R. Tunstall Taylor of the Army Medical Museum, certain pictures. If the

wearers of pointed high-heeled shoes can get any comfort out of these pictures they are welcome to it. We do not wish to indulge in hyperbole or hysterical denunciation but is there any real exaggeration in stating that the wearing of this type of shoe is just as nonsensical as the wearing by savage races of rings in the nose, the frightful distortion and crippling of their feet practised for centuries by the Chinese women, or such practises as those followed by the Flat Head Indians who deliberately deformed the heads of their children by strapping a board to a developing child's head? Ignorance of the causes of foot-strain and slavish submission to fashion are responsible for a vast amount of ill-health and nerve tension. Many people whose heads are crammed with knowledge of history and literature and even of science have never become fully acquainted with their bodies. While we are speaking here in a general sense, nevertheless the responsibility really falls upon the individual. It is up to him or to her to act in this matter and assist in freeing the world from foot-strain.

Can the Government help in such a matter? Why not? If it is considered a sound public policy to label food products that

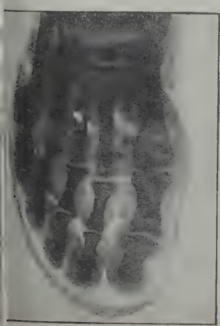
Slippers with French Heels—used many for shopping, dancing, abing, walking, indiscriminately.—ossly distort the feet.

Ordinary type of woman's shoe —so-called "common sense"—causes distortion, deformity, disinclination to walk; often leads to poor circulation, indigestion, anemia.



-Ray of woman's foot in walking per with French heel.—Note bony ortion. Causes backache, foot- e and "nerves."

X-Ray of woman's foot in ordinary shoe with pointed toe. Note deformity of great toe and enlargement of joint.



X-Ray of foot in Mun- ı Army Shoe. Ample om for toes. No ma- 'ial distortion of nor- ıl relationship of toes.

Life Extension Institute. One type of correct shoe for women with straight inner edge and adequate space for toes. (Recommended by American Posture League).

Courtesy of Major R. Tunstall Taylor of Army Medical Museum.

A Group of Filipinos

Note the parallel relation of the feet in walking and the straight inner edge of the feet in this

contain coloring matter and preservatives, many of which have but slight, if any, harmful effect on the body, why should it not be entirely reasonable to require shoe manufacturers to place the following label on all ordinary conventional shoes not made in accordance with anatomical principles:

"This shoe is not made in accordance with anatomical principles but in accordance with popular demand and fashionable custom. The purchaser wears this shoe at his own risk. The manufacturers do not guarantee that it will not harm or distort the foot."

The exercise most highly regarded in the treatment of flat-foot among soldiers is that recommended by Major R. Tunstall Taylor of the Surgeon-General's office: "Stand with feet parallel and somewhat apart with great toes firmly gripping the ground. Without bending the knees or moving the feet rotate the thighs outward repeatedly. This is chiefly done by strong contraction of the great muscles of the back of the thigh and seat." (Exercise 14, page 281.)

Exercises should be graduated according to age and physical condition as ascertained by a complete medical examination. Many people have ruined their cir-

culatory apparatus by some one's "Physical Culture" carried on in ignorance of their real condition and needs. We can not make this warning too emphatic for middle-aged people and it is not to be disregarded by the young.

A striking instance of the harm that physical culture can do by not taking into account the underlying condition of the individual is the following case that passed through the Institute:

A woman of 40 had been treated for some passing trouble by her physician, and heart irregularity was detected. Later, when suffering from shortness of breath, she wrote her physician regarding this matter and he reassured her but urged her to take a rest from business and have a thorough medical examination with regard to the heart condition and follow the directions of her physician. Instead of doing this she sought relief through a physical culturist of national repute. She was told that her trouble was due to asthma and partly to faulty condition of the stomach and was given a series of exercises to improve the condition of the "nerves and muscles controlling the stomach." When examined by the Institute she showed a condition of partial paralysis and

a well-marked valvular defect of the heart. The condition of partial paralysis was probably caused by the stoppage of a blood-vessel in the brain (embolism), a condition more than likely the result of injudicious exercise in a subject with such a severe valvular trouble.

In such a case "physical culture" is certainly needed, but this should mean fresh air and very carefully regulated exercise kept strictly within bounds and governed by the physician according to the effect on the patient. No doubt the exercises this woman took would have been very beneficial to most people without such an organic defect, but in her case a tremendous risk was assumed.

Games, mountain-climbing, hill-climbing, walking, swimming, skating, golf, tennis, are interesting and exhilarating. Outdoor exercise should be sought in addition to formal systematic exercise. The latter can be made much more interesting and effective if performed to music. A talking machine can be advantageously used for this purpose. Exercises thus partake of the virtue of dancing and are exhilarating and interesting.

SECTION IV

HYGIENE OF THE BRAIN AND THE NERVOUS SYSTEM

In the sixteen rules of hygiene, we have emphasized the importance of serenity and poise. These characteristics lie at the very foundation of hygiene of the brain and nervous system. They can not be attained unless the psychic life is well ordered in all respects with regard to its hygiene.

Among other advantages derived from war activities has been a closer study of the factors that are involved in the failure of nervous and mental control as exhibited under the strain of war.

These lessons that so intimately concern us in the care and rehabilitation of the wounded or shell-shocked soldier may also be applied in the ordinary nervous problems of civil life.

The following consideration of these matters may prove helpful to those who have either military or civil problems of this type to solve.

Shell-Shock and Life-Shock

Colonel Salmon, of the Medical Corps, United States Army, and a member of the Hygiene Reference Board of the Institute, has collected some interesting information on this subject which forms the basis of his lectures in the Medical Officers' training camps. He and others have called attention to the fact that the term shell-shock is used too loosely. As a matter of fact, many of the nervous manifestations usually included under this term (often, it is true, concentrating in some profound mental or nervous failure at the time of exposure to shell-fire) are simply cumulative effects of general war strain. Some interesting lessons bearing upon nervous maladies to which so many are subject in civil life, can be drawn from these experiences.

It is also important that a condition in which so many families throughout our country are likely to become deeply concerned, should be understood by the public and that those who return from the battle-front miserably suffering from these conditions should receive the right kind of treatment from their friends and families. Many profound nervous disorders, neurasthenia, hysteria, and the like are, of course, more readily developed in

people with poor nervous and mental endowment at birth. Yet many people with average family histories are more or less unstable in their nervous organization. If the strain is sufficient, they lose their poise and drift into pitiable conditions of chronic ill-health and life-failure. Students of nervous diseases have called attention to the fact that in civil life these serious nervous disorders, characterized by such conditions as sudden deafness, loss of speech, periodic vomiting, insomnia, loss of memory, sleep-walking, paralysis not due to injury or hemorrhage of the brain, as well as that vague collection of fears, anxieties, and will-failure termed neurasthenia, are due to the effort of the individual to escape from some intolerable situation. Life struggle presents itself to them as a hopeless battle and they seek refuge in their nervous maladies. They seek to evade that struggle with environment which every organism and every race must make if it is to survive. These sufferers are, of course, not conscious of this underlying motive.

Some authorities hold that the nervous maladies of war, so-called "war neuroses," should be considered as a special group of diseases, occurring in the main among people who would on the average successfully with-

stand the strains of civil life. Sufferers from shell-shock are not necessarily those who show hereditary or personal history of nervous insufficiency. They are merely individuals of sensitive types, whose normal resistance has been overcome by the extraordinary and unremitting impact of the peculiar shocks and strains and stresses of modern war, unprecedented for its devilish ingenuity in torture.

A case is cited of a non-commissioned British officer who had seen eleven months of active service, during which period he was wounded twice, gassed twice, buried under a house, and treated five times in the field ambulances for minor injuries. While on ordinary leave in England, apparently in good health, he became unconscious while waiting for a train and was ill with severe war neuroses, lasting several months. This man had shown rare courage and endurance but had passed his limit.

These war neuroses are rare among the wounded. The wounded state displaces shell-shock and excludes the accumulated mental strains and stresses that have gone before.

Another interesting fact is the frequency of war neuroses of the lesser magnitude among officers and the rarity among them of

the more serious nervous manifestations o
the hysterical type.

The ratio of officers to men, at the front, i
1 to 30, among the wounded 1 to 24, bu
among those admitted to hospitals for wa
neuroses the ratio is 1 to 6.

No doubt there are cases of actual brain o
nerve injury due to concussion of air ac
companying shell explosions, but these me
chanical causes are regarded as less fre
quently responsible for war neuroses than th
mental effects of general war strain. Such
cases need most delicate handling. Neithe
harshness nor unjust suspicion of malinger
ing should be permitted by the medica
officer; on the other hand, the patient shoul
not be looked upon as a hopeless nervou
wreck incapable of responding to appeals t
his latent manhood and control.

Some authorities have claimed that abou
70 per cent. of the cases of "war nerves" ar
among average types. It seems entirely rea
sonable that there must be a very consider
able proportion of people fully able to bea
up under ordinary forms of life struggle, ye
inadequate to bear these tests of war. Th
military authorities have made special ef
forts to exclude from the army those wh
show positive signs of nervous weakness

With regard to such cases, all agree that immediate treatment and a heroic effort to hold the soldier in the line and restore his confidence and bring him to a firmer grip on the situation is the best treatment. A special study of these cases will be made by men trained to this work and their efforts will be directed largely to preventing the sufferer from gradually sinking into a state of permanent retreat from life struggle. Warning is given that sufferers from these nervous war maladies, who are too much coddled, who drift to their homes, who become more or less fixt in their delusions, obsessions, fears, and other disabilities, offer the least hope of cure.

We find that these principles hold good in civil practise when dealing with nervous types. These conditions which we meet so commonly among civilized people might well be termed ''life-shock.'' As in shell-shock, the immediate shock is not wholly responsible for the result. There has been accumulating a series of minor shocks which have gradually broken down the will power of the individual and driven him into a retreat from a stand-up fight with his environment. We find, therefore, that the essence of prevention and of cure in nervous maladies, whether in the

war zone or at home, is to face the enemy and keep hitting the line. Firm, tactful treatment by one familiar with the mechanism of such maladies is all important.

The basis of most nervous maladies, which do not have their origin in actual tissue changes or tissue injuries, as in the case of infections, is not fear, in exactly the popular sense of the word, but as already exprest, rather a retreat from difficulty under such conditions that the individual is not conscious of the fact that he is guilty of retreat. It seems important to bring this fact more forcibly before the people—the fact that, after a thorough physical examination has revealed no organic or physical cause for nervous disease, there is an obligation on the part of the individual to measure up to the life struggle and not to take the avenue of retreat. If it were more clearly understood that a bold front to the enemy will cause him to retreat, there would be less nervous failure.

It is an interesting and characteristic fact, that in the treatment of these cases of so-called shell-shock, stress is laid upon productive occupation. These sufferers are given something useful to do and in adapting themselves to real work they regain their

hold on life. There are very few cases where a prolonged rest cure is required. This raises the old question as to whether a healthy man can really be overworked. Of course, there can only be one sensible answer to such a question. Undoubtedly overwork can break down the mind and nervous system, but it is astonishing how much work a well-cared for body and mind can carry through. It is poor mental government and a faulty attitude toward life, rather than overwork, that bring about mental and nervous breakdown. Often it is not the work itself so much as the lack of balance to the work and proper recreational habits and an interest in doing something that is worth while. Often there is an absorption of anxieties, fears and obsessions instead of casting them out into the open, where in the full light of day they are found to be ridiculously insignificant and unimportant.

The sufferer from shell-shock has, of course, been facing real danger, a tremendous, appalling menace to his life and a possibility of intense suffering. If, under proper treatment, such men can be fully restored to normal poise and are again able to meet these frightful perils, the sufferer in civil life may well take heart and face the an-

noyances, strains and perils of ordinary existence, which dwindle into insignificance when compared to those of the battle front.

"Pack up your troubles in your old kit-bag and smile, smile, smile"—these are brave words and they offer the finest kind of resistance to many nervous maladies and to mental ill-health.

But there are many things that can not be smiled away, and one can lose a lot of valuable time smiling when very definite action is needed. You can not smile a root abscess out of your jaw; you can not smile away weak feet or stoop shoulders or pus infected tonsils or defective eyesight. It is fine to smile at your meals, for it aids digestion, but that does not balance your diet. A smile will not take the place of lime or fruit acids or green vegetables in your diet. You may smile as you put poison into your body but the smile is not an antidote. Courage alone can not do everything; it must be well directed. It is simply a phase of right living.

The military importance of these mental and nervous problems is thus commented upon by Colonel T. W. Salmon:

"No medico-military problems of the war are more striking than those growing out of the extraordinary incidence of mental and

functional nervous disease (shell-shock). Together, these disorders are responsible for not less than one-seventh of all discharges for disability from the British Army, or one-third, if discharges from wounds were excluded. . . . By their very nature, moreover, these diseases endanger the morale and discipline of troops in a special way and require attention for purely military reasons."

Conditions among these picked troops suggest the importance of considering more closely the influence of faulty mental hygiene as a factor in health-failure and life-failure in the civil population under average life strain.

SECTION V

ALCOHOL

ONE of the most satisfactory ways of not ing the influence of alcohol on longevity i by the records of life insurance companie wherein the death-rates among those ab staining from alcohol have been computed a compared to those of the general class o insured lives. In considering such figure it is well to bear in mind that the general o non-abstaining class comprises only thos who were accepted as standard health risks and so far as could be determined wer moderate in their use of alcohol. Such ex periences have been carefully compiled b the following companies:

United Kingdom Temperance and Gen eral Provident Institution of London;[1]* Th Sceptre Life;[2] The Scottish Temperanc Life of Glasgow;[3] The Abstainers and Gen eral Life of London;[4] The Manufacturers

* The notes ("1" etc.) refer to the publications listed at th close of the section.

Life of Canada;[5] Security Mutual Life of Binghamton, N. Y.[6]

Comparative Mortality Among Abstainers and Non-Abstainers

The comparative mortality among abstainers and non-abstainers in several of these companies is shown in the charts exhibited in this section.

It is probable that the heavier mortality among non-abstainers as compared to abstainers is not wholly due to the chemical effect of alcohol on the tissues, but in some degree to collateral excesses (especially those resulting in infection from the diseases of vice) and a more careless general manner of living engendered by alcoholic indulgence; that, furthermore, those who indulge in so-called moderation are open to greater temptation to increased indulgence and final excess than those who abstain altogether.

It has often been alleged, however, that the lower mortality among abstainers was due solely to a more conservative habit of living, and that this class is largely composed of people in favorable or preferred occupations, such as clergymen and teachers.

The experience of the Security Mutual of Binghamton, N. Y., does not support such a postulate. During a twelve years' experience the mortality among the abstainers was one-

third that of the tabular expectation, and their occupations were classified as follows

Clergymen	4 per cent.
Farmers	19 " "
Clerks	15 " "
Miscellaneous (earning $15 to $25 per week)	62 " "

Mr. Roderick McKenzie Moore, Actuary of the United Kingdom Temperance and General Provident Institution,[7] has this to say regarding the abstainers' class in that company:

The total abstainer class was not "nursed or favored to produce a low mortality. So far as could be determined (and many of the risks came in personal contact with the officers) they were of the same general class as the non-abstainers. They were written by the same group of agents, for the same kind of policies, for the same average amounts, *and were in the same general walks of life*, and of the same general financial condition. They were almost equal in numbers to the general class, and did not form a small high-grade section of the policyholding body. On the contrary, greater care was exercised in the selection of the non-abstainers because of the less favorable experience anticipated on them and many borderline risks were accepted in the abstaining class because of a feeling that their abstinence would neutralize some unfavorable factor

UNITED KINGDOM TEMPERANCE AND GENERAL PROVIDENT INSTITUTION, 196 STRAND, LONDON

MORTALITY EXPERIENCE UNDER ORDINARY WHOLE LIFE POLICIES, 1866-1917

Years	TEMPERANCE SECTION			
	Expected Claims		Actual Claims	
	Policies	Sums Assured	Policies	Sums Assured
866–70 (5 years)	549	100,446	411	72,676
871–75 (5 years)	723	139,819	511	97,773
876–80 (5 years)	933	193,748	651	126,142
881–85 (5 years)	1,179	268,272	835	168,003
886–90 (5 years)	1,472	359,061	1,015	259,114
891–95 (5 years)	1,686	430,211	1,203	278,815
896–00 (5 years)	1,900	505,332	1,402	370,374
901–05 (5 years)	2,021	574,144	1,456	378,487
906–10 (5 years)	2,291	739,414	1,504	441,838
911–15 (5 years)	2,609	859,332	1,638*	520,974
916–17 (2 years)	1,098	380,884	822*	255,835
52 years	16,461	£4,550,663	11,448	£2,970,031

Years	GENERAL SECTION			
	Expected Claims		Actual Claims	
	Policies	Sums Assured	Policies	Sums Assured
866–70 (5 years)	1,008	196,352	944	230,297
871–75 (5 years)	1,266	257,450	1,350	255,062
876–80 (5 years)	1,485	311,326	1,480	322,644
881–85 (5 years)	1,670	367,214	1,530	327,100
886–90 (5 years)	1,846	429,046	1,750	388,913
891–95 (5 years)	1,958	476,558	1,953	462,201
896–00 (5 years)	2,058	535,686	1,863	477,145
901–05 (5 years)	2,221	613,207	1,961	522,820
906–10 (5 years)	2,282	681,932	1,900	544,946
911–15 (5 years)	2,228	767,157	1,870†	641,139
916–17 (2 years)	863	317,510	738†	283,609
52 years	18,885	£4,953,438	17,319	£4,455,876

* Including 23 War Claims for £20,250, Temperance Section; d 21 War Claims for £19,900, General Section.

† Including 91 War Claims for £26,335, Temperance Section; d 63 War Claims for £32,504, General Section.

The mortality experience of the lives assured in the Abstainers and General Insurance Company, Abstainers' Division of the Ordinary Department, during the 33 years 1884-1916, is reported by the consulting actuary as follows:

Age	Years of Life under observation	Deaths "Expected" under the HM Table of the Institute of Actuaries	Actual Deaths War included	Actual Deaths War excluded	Ratio of Actual to "Expected" Deaths War excuded
10–24	19,767	123.1	62	42	34.1
25–34	71,685	544.7	217	184	33.8
35–44	65,380	656.5	229	225	34.3
45–54	35,145	532.5	227	223	41.9
55–64	12,561	341.6	192	191	55.9
65–90	3,538	241.5	170	170	70.4
Total..	208,076	2,439.9	1,097	1,035	42.4

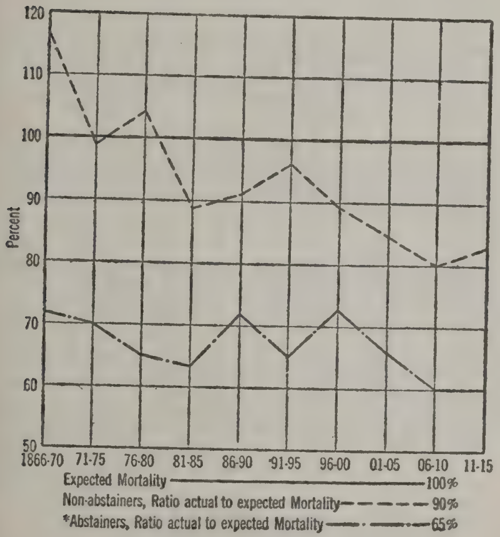
SCOTCH TEMPERANCE LIFE ASSURANCE CO., LIMITED GLASGOW

MORTALITY EXPERIENCE, THIRTY-FIVE YEARS, 1883-1917

Period	Temperance Section: Claims Expected*	Temperance Section: Actual Claims	Temperance Section: Ratio of Actual to Expected	General Section: Claims Expected*	General Section: Actual Claims	General Section: Ratio of Actual to Expected
1883–1887	43	15	35%	11	7	62%
1888–1892	159	79	50%	49	33	68%
1893–1897	290	138	48%	95	67	70%
1898–1902	444	188	42%	164	118	72%
1903–1907	609	298	49%	223	123	55%
1908–1912	770	356	46%	271	186	69%
1913–1917	926	627†	68%	317	260†	82%
	3,241	1,701	52%	1,130	794	70%

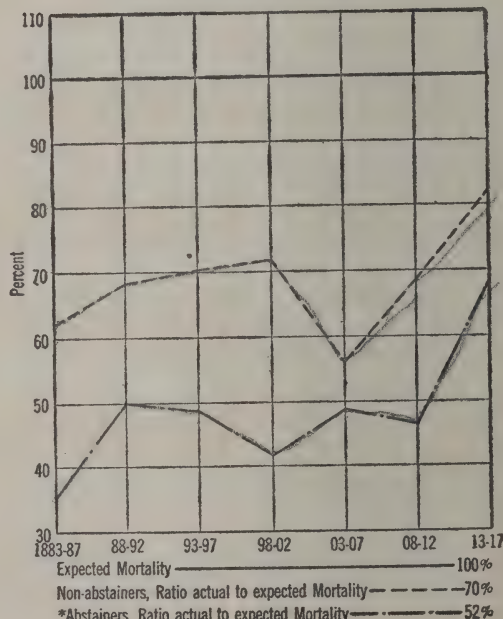
* According to tables compiled by the Institute of Actuaries from the experience of twenty leading life assurance companies.
† Including war mortality.

UNITED KINGDOM TEMPERANCE AND GENERAL PROVIDENT INSTITUTION OF LONDON. HEALTHY MALES—WHOLE LIFE POLICIES 1866-1917 (AMOUNTS)



* The death loss by policies was approximately the same, % for general section ; 69% for the temperance section.

THE SCOTTISH TEMPERANCE LIFE ASSURANCE CO. OF GLASGOW.
HEALTHY MALES—WHOLE LIFE POLICIES 1883-1917 (LIVES)



* Including war mortality.

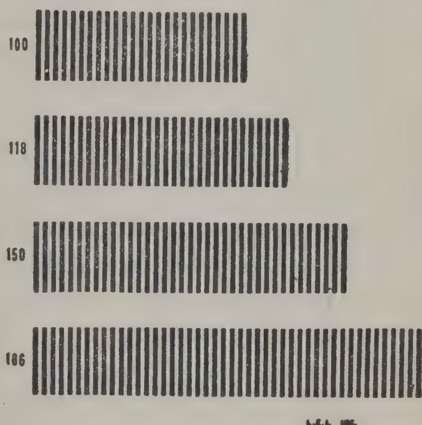
COMPARATIVE MORTALITY AMONG USERS OF ALCOHOL—43 AMERICAN LIFE INSURANCE COMPANIES, 1885-1905.

0. Death rate among insured lives generally medico actuarial table.

1. Death rate among policyholders using 2 glasses of beer or 1 glass of whisky daily.

2. Death rate among policyholders giving history of past intemperance, but apparently cured.

3. Death rate among policyholders using more than 2 glasses of beer or 1 glass of whisky daily, but regarded as temperate and standard risks.



Now that accurate laboratory evidence is available regarding the physiological effect of alcohol in so-called moderate doses, the insurance experience seems consistent. The higher mortality among so-called moderate drinkers is only what we would naturally expect to find in the light of the most recent knowledge regarding the effects of alcohol upon the human organisms, not only in the direct causation of disease, but in lowering the defense to disease and increasing the liability to accident, and the tendency to careless living.

Medico-Actuarial Mortality Investigation

In the recent medico-actuarial investigation, including forty-three American life insurance companies, the combined experience on users of alcohol has been compiled, with very interesting results.[8] It may be subdivided as follows:

First: Individuals who took two glasses of beer, or a glass of whisky, or their alcoholic equivalent, each day. In this group the mortality was 18 per cent. in excess of the average.

Second: Those who were accepted as standard risks but who gave a history of occasional alcoholic excess in the past. The mortality in this group was 50 per cent. in excess of the mortality of insured lives in

general, equivalent to a reduction of over four years in the average lifetime of the group.

Third: Men who indulge more freely than the preceding group, but who were considered acceptable as standard insurance risks. In this group the mortality was *86 per cent.* in excess of the average. In short, we find the following increase of mortality over the average death-rate among insured risks generally:

Steady moderate drinkers but accepted as standard risks	86 per cent.
Having past excesses	50 " "
Very moderate drinkers	18 " "

This means that steady moderate drinkers who exceed two glasses of beer or one glass of whisky daily are not, on the evidence, entitled to standard insurance, but should be charged a heavy extra premium.

In these groups, the death-rates from Bright's disease, pneumonia and suicide were higher than the normal.

Laboratory and Clinical Evidence Relating to the Physiological Effects of Alcohol

To interpret correctly the mortality statistics relating to moderate drinkers and total

abstainers, one must have some knowledge of the physiological effects of alcohol in so-called moderate doses, a knowledge which is often lacking in those who assume to interpret such statistics.

For example: If it could be shown that small doses of alcohol produce no ascertainable ill-effects upon the human organism, the higher mortality among the moderate drinkers as compared to total abstainers might have to be explained as due to some as yet unrecognized cause or causes other than alcohol. But if laboratory and clinical evidence shows that alcohol in so-called moderate quantities (social moderation) produces definite ill-effects, such as lowering the resistance to disease, increasing the liability to accident and interfering with the efficiency of mind and body and thus lessening the chances for success in life, to say nothing of any toxic degenerative effect upon liver, kidneys, brain and other organs, the excess mortality that unquestionably obtains among moderate drinkers as compared to total abstainers may without hesitation be ascribed chiefly to alcohol.

It is not possible here to give all the evidence, but the following items will serve to clarify these questions.

Effect on Brain and Nervous System

Kraepelin[9] and his pupils have contributed most extensively to our knowledge on this subject. According to such authorities, a half to a whole liter of beer is sufficient to lower intellectual power, to impair memory, and to retard simple mental processes, such as the addition of simple figures. Habitual association of ideas, and free association of ideas are interfered with.

As far back as 1895, Smith demonstrated the influence of small doses of alcohol in impairing memory, and these results have been confirmed by Kraepelin and quite recently by Vogt[10] in experiments on his own person—15 cc. (about 4 teaspoonsful) of whisky on an empty stomach, or 25 cc. with food, being sufficient to distinctly impair the power to memorize.

Careful and exact experiments have shown the influence of moderate doses of alcohol in lessening the amount of work performed by printing compositors. There has also been shown a disturbance in the sequence of ideas. The time that elapses between an irritation and the beginning of a responsive movement can be measured within one one-thousandth of a second. According to Aschaffenburg,[11] under the influence of even very small doses of alcohol this reaction period is disturbed

and at first shortened. It is below the normal, the acceleration being attained at the expense of precision and reliability. Indeed, the reaction is often premature, and constitutes a false reaction—"the judgment of the reason comes limping along after the hasty action."

(As will later be shown, Benedict's experiments require that some modification be made of this too simple formula.)

It is now conceded that alcohol is not a real brain stimulant, but acts by narrowing the field of consciousness. By gradually overcoming the higher brain elements the activities of the lower ones are released, hence the so-called stimulation and the lack of judgment and common sense often shown by those even slightly under the influence of alcohol. The man who wakes up under alcohol is really going to sleep, as far as his judgment and reason are concerned. Complete abolition of consciousness is brought about by sufficient doses, as when ether or chloroform is taken.

Under moderate doses, muscular efficiency is at first increased a little and then lowered, the total effect being a loss in working power, as shown by the experiments of Dubois, Schnyder,[12] Hellsten,[13] and others.

Influence on Bodily Reistance to Disease

Muller, Wirgin and others [14] have shown that alcohol restricts the formation of antibodies (the function of which is to resist infection in the blood) in rabbits, and Laitinen [15] has shown that the prolonged administration of small doses in men (15 cc.) is sufficient to lower vital resistance, especially to typhoid fever.

Rubin [16] has demonstrated that alcohol, ether and chloroform, injected under the skin, render rabbits more vulnerable to streptococcus (blood poison) and pneumococcus infection (pneumonia); Stewart,[17] that small amounts lower the resistance to tuberculosis and streptococcus infection; Craig and Nichols,[18] that moderate doses of whisky were sufficient to cause a negative Wassermann reaction in syphilitic subjects; Fillinger [19] found the resistance of red blood cells much reduced after the administration of champagne to healthy human subjects. Similar results were found in dogs and rabbits.

Weinburg [20] confirmed these results by the same methods, showing that 20 per cent. of the red cells lose their resistance after the administration of 450 cc. of champagne.

Parkinson,[21] in a series of careful tests, failed to establish any influence on phagocy-

tosis (capacity of the white blood cells to destroy bacteria), except when large doses or continuous moderate doses were taken.

Effect on Circulation

On the heart and circulation, alcohol acts as a depressant, increasing the rate, but not the force, of the pulse. It causes depression of the nerve center controlling the blood vessels and thus lowers blood pressure. Large doses cause paralysis of these nerves and of the heart.

This has been further emphasized by the studies of Reich [22] at the University of Munich, who found that the resistance of blood cells to salt solution and to typhoid bacilli was less among alcohol users than among total abstainers.

Miller and Brooks [23] found from small doses (6 to 12 cc. absolute alcohol) an increase in blood pressure in conscious (unanesthetized) animals, contrary to the findings of Crile,[24] Cabot,[25] Dennig,[26] Hindelang and Grünbaum, Alexandroff [27] and others, *in man;* but the amounts were small and variable, according to individual susceptibility, *thus showing the drug to be, even on such evidence, uncertain and unserviceable as a heart stimulant.*

Food Value

Atwater and Benedict,[28] and Mendel,[29] have shown that alcohol is a "protein

arer," and can, to some extent, take the
ace of fats and carbohydrates. This is
at is meant by calling alcohol a "food."
ways, however, it fails to pass some test
which true foods are measured. Apart
m its effect on the nervous system, among
ich must be figured its action on the blood
ssels which causes a *loss of body heat,*
ndel has shown that in moderate doses
5 cc. daily) it increases the output of uric
d and allied (purin) bodies derived from
tissues, a fact which distinguishes it
m all other foods. These poisonous or
ig effects must always be considered, to-
her with any alleged nourishing effects.
cohol is still used by some as a rapidly
ailable fuel-food in fevers, and when ordi-
ry foods can not be readily digested and
de available. But this is done to a much
s degree than formerly, now that its nar-
ic and poisonous effects are more fully
derstood. Sugar and water often serve
te as useful a purpose.

Lately further light has been thrown upon
alleged food-value of alcohol. The one
at therapeutic stronghold still held by
ohol is diabetes. Even Ewald, and others
ongly opposed to the use of alcohol gen-
lly as a therapeutic weapon, concede its

value in this disease because of its alleg
action in preventing the development
acidosis when starches and sugars are wit
drawn or greatly reduced in the diet. Th
this view is based on dogma and not
scientific fact has lately been shown by Hi
gins, Peabody, and Fitz in their experimen
at the Carnegie Institution and at the Pet
Bent Brigham Hospital, where careful
controlled experiments on normal huma
beings showed not only an absolute lack
acidosis-preventing influence on the part
alcohol, but an actual acceleration of su
conditions by its use, the measuremen
being made by the most delicate and a
curate methods available to science (oxyge
tension of alveolar air).

This evidence concerns normal people
well as diabetics, because the trend of mo
ern diet is toward the overuse of acid-form
ing foods, such as eggs, meat, fish, cereal
and an insufficient use of base-forming food
such as most fruits and vegetables. Thos
who eat inordinately of these concentrate
flesh foods and also drink alcohol, are i
creasing the tendency to acidosis, a cond
tion which in its milder form is often give
the absurd misnomer of "biliousness." (Bil
never has anything to do with the symptom
usually charged against it.)

It seems reasonable, on the evidence here- presented, to class alcohol among the arcotic or "deadening" drugs, such as her or chloroform. Indeed, Aschaffen-urg[30] has recently called attention to the rowth of the ether habit in eastern Ger-any, where this drug is used as a so-called imulant, while in reality the effects are ell known to be narcotic, or deadening.

Additional Notes on Alcohol

There has lately been undertaken at the utrition Laboratory of the Carnegie Insti-tion at Washington a very broad and mprehensive study of the effect of moder-e doses of alcohol on the healthy and rmal human body. The immense scope of e investigation planned may be judged the fact that under the physiological di-sion of the research, as laid out by Pro-ssors Raymond Dodge and F. G. Benedict, ere are seven main sections and one hun-ed and sixty subdivisions. The program s been arranged after conferences, either person or by letter, with the leading ysiologists of the world, and may take years to complete. Nutrition Laboratory Experi-ments

The psychological program carried out th the cooperation of Dr. F. Lyman Wells, Psycholog-ical Effects

has already been completed and the results recently published.[31] These results must be accepted as the testimony of pure science free from all bias or even remote suggestion of propaganda. They were based upon experiments with moderate doses of alcohol (30 cubic centimeters, or about 8 teaspoons-ful, and 45 cubic centimeters) upon ten normal subjects, very moderate users of alcohol, and may be summarized as follows

Lower Levels Spinal Cord

A very simple reflex act, the "knee-jerk," a nervous mechanism controlled by a center at the lower level of the spinal cord, was markedly deprest, the time of response being increased 10 per cent. and the thickening of the muscles concerned in the act decreased 45 per cent. In some subjects the larger dose, 45 cubic centimeters, practically abolished the knee-jerk.

The eyelid reflex, elicited by a sudden noise, showed the next largest effect, the time of response being increased 7 per cent and the degree of movement decreased 19 per cent.

Other nervous mechanisms, or reflex arcs at the higher levels of the cord, were next investigated: (1) eye-reaction to suddenly appearing stimulus, and (2) speech reaction to visual word stimuli. Dose A (30 cubic

ntimeters), acelerated the eye-reaction, hile dose B (45 cubic centimeters) posi-vely deprest it, agreeing with the simple action experiments of Kraepelin. This as the only instance of acceleration of ovement of the voluntary muscles through cohol, all the other tests showing it to be consistent depressant. The speech reac-n showed a positive depressant effect of per cent.

Higher Levels

Free association of ideas and memory ts were also made, and showed practically effect from alcohol, but, unfortunately, smaller dose only was used in these ts.

Memory

The sensitiveness to electrical stimulation s decreased 14 per cent.

Motor coordination, as evidenced by eye-vements in fixating seen objects, was next estigated. The velocity of these move-nts was decreased 11 per cent. Finger-vements, measured in an exceedingly deli-e way, were reduced in speed 9 per t.

The effect on the pulse while these tests e made was observed, and electrocardio-ms taken. The pulse was found to be elerated, but not increased in force, that the "brake" was taken off the heart, but

Heart and Pulse

no driving force supplied by alcohol. Th condition of the circulation was impaired b the narcotic effect of alcohol on the cardi inhibitory center which holds the hea action in check.

Decreases Organic Efficiency

According to the investigators, the effe is to "decrease organic efficiency." Thi should shut off such little debate as sti persists with respect to alcohol having an value as a direct heart stimulant.

Always a Depressant

While these investigations only confirm i part the contention of the Kraepelin scho that alcohol first acts by depressing th higher centers, and tend to show that it first and most profound effect is on the lowe levels of the spinal cord and the simple nervous mechanisms, it confirms the view o these and other investigators, that the tot effect of alcohol is that of a narcotic, d pressing drug, even in the smallest dose usually taken as a beverage.

Resistance of Higher Brain Function

The possible reactions are more comple than those supposed by Kraepelin, and ther is evident in the higher centers (the effe on highest brain functions were not mea ured by Dodge and Benedict) a power o "autogenic reinforcement," which is we exemplified by the ability of a half-intox cated person to sober up under some sho

strong incentive. When social conditions o not stimulate this reinforcement, but, on e contrary, dull and retard it, as in convivial company, there is reinforcement of e lower, more animal mechanisms of the rvous system, and we have exhibited reulting and foolish reactions to alcohol, hich are consistent with these findings.

Explanation of Memory Effects

The slight effect on memory and free assoation is explained partly by the methods ed in the laboratory (difference in time of cognizing words suddenly exposed a secd time), which are more in the nature of hort cuts'' and perhaps not so accurate a production of normal memorizing as those ployed by Kraepelin and Vogt (memoriz- numbers and verse), and partly by the wer of ''autogenic reinforcement,'' which is difficult to eliminate in a laboratory t.

This, the latest contribution of science to study of alcohol, gives added proof that higher mortality among so-called modte users of alcohol is largely due to the avorable effect on the protective mechan of the body.

The laboratory and the life insurance recs simply give exact expression to what long been a matter of common knowl-

edge to the employer of labor and to leade
and commanders of men: to wit, that the i
fluence of alcohol on any large group
men, whether they be artizans or soldie
is harmful and lowers the efficiency of t
group. Individual susceptibility varies, b
the man who thinks he is an exception a
can indulge with safety may find that he
mistaken only after serious damage to t
body has been done and perhaps a defini
loss sustained in happiness and achieveme

Dr. J. W. Ballantyne in a recent revi
of this question shows that the balance
evidence confirms the experiments
Stockard and Popanaculaoci, Bertholet a
Mjöen as to the injurious effect of alco
on the offspring of mammals, thus esta
lishing the biologic fact that the germ-pla
of an alcoholic parent can be adversely
fected, contrary to the dogma of those w
hold without anything approaching c
clusive evidence that the germ-plasm is pr
tically inviolate and can not be influen
by acquired characteristics or toxic ind
gences of the parent. With such eviden
available the honest and conscientious pare
or prospective parent will ask proof positi
that alcohol can not injure the germ-pla
and the unborn child, rather than accept

onclusions of Karl Pearson and his school ased upon a statistical study of limited roups and an interpretation that is by o means free from statistical fallacies. 'or example, the superior condition of the hildren of drinking parents found in Pearon's investigation may well be due to an limination of the unfit children of the rinker and survival of the fit. Furtherıore, such evidence could only be held as onclusive if homogeneous groups are comared. That is, the offspring of drinking arents and of non-drinking parents who re exactly of the same physical type and osely similar in all other respects, as to ccupation, environment, etc., should be ompared, if the influence of alcohol is to e accurately determined by the statistical ethod.

Those who trifle with alcohol should at ast take the precaution to be periodically amined in order to detect the earliest signs ' ill-effect. One's own feelings are not safe uides, and may fail to warn of danger ntil serious damage has been done.

In 1914, at the annual meeting of the Naonal Council of Safety, at which there were esent representatives from several hun-ed large industries, the members unan-

imously voted to abolish liquor from their plants. It has been well stated by Quensel[32] that "work and alcohol do not belong together, especially when the work demands wide-awakeness, attention, exactness and endurance."

The restrictive and prohibitive measures of European governments, and the warnings uttered by Lord Kitchener and leading British statesmen, are sufficient evidence that the condemnation of alcohol represents the deliberate judgment of the world's strong men.

Added to this we now have the experience derived from the action of our own government in establishing regulations for the maintenance of what amounts to total prohibition in the home military camps and in the Expeditionary Forces. General Pershing has rigorously excluded alcohol in all forms from our troops abroad and is known to be opposed on military grounds alone to its use for beverage purposes by the troops.

As to the civilian population, after various restrictive measures applied to the manufacture of spirits and brewing, the manufacture of beer ceasing by order of the President on December 1, 1918, bills for wartime prohibition to go into effect July 1, 1919, have

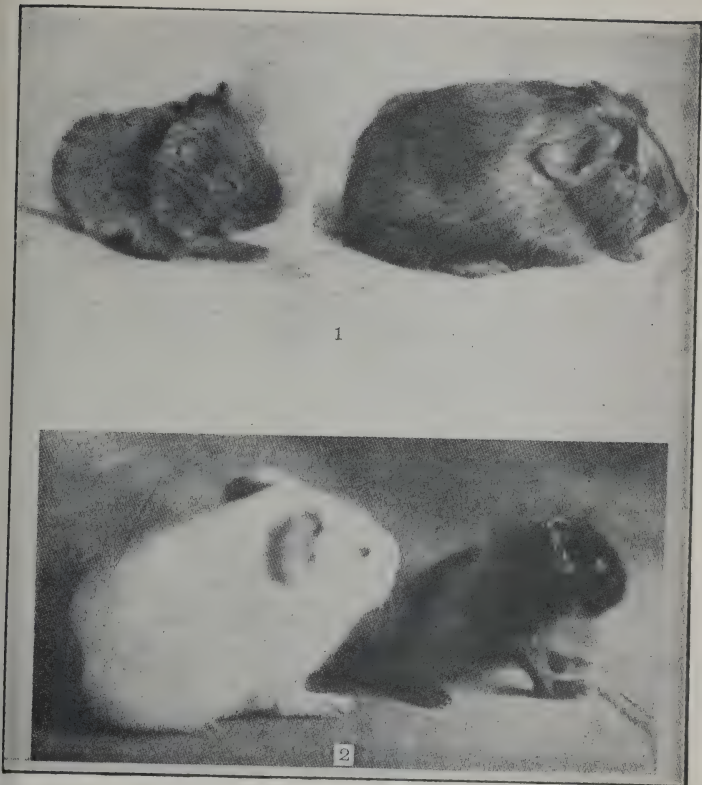
assed both houses and have had the signa-
ure of President Wilson. Alcohol for the
rst time in history is placed by a great
ation in a position where it must assume
he offensive. Instead of being entrenched
n immense business enterprises and indus-
ries it is absolutely outside the breastworks
nd before readmission on a basis of free-
om such as it formerly enjoyed it must
rove that it is safe, it must show that it is
ntitled to tolerance, and that even its re-
tricted use for beverage purposes is ap-
roved and desired by a majority of the
eople. In the interval there will be an op-
ortunity to observe whether any of the
rightful injuries alleged by many people
o follow in the wake of prohibition actually
ccur. No doubt there will be instances of
ffort to find a substitute. Distressing cases
ay occur and be made much of, but judg-
g from the condition in the armies and
amps where prohibition already practically
xists, the so-called evils of prohibition are
finitesimal in comparison with the former
emendous injury from alcoholic indulgence.
atification of the constitutional amendment
roviding for nation-wide prohibition has
ken place, the necessary majority of States
aving voted affirmatively.

Is it not worth while, after all, for broac minded men to agree on such an experi ment? Why waste the energy of th nation in continuous debate and argumen on such a question when a few years experience would settle it for this genera tion and for posterity. Not the least of th by-products of the war is the remarkabl development of public sentiment makin possible such an experiment.

Effect on Offspring

Stockard,[33] in his experiments on animal has demonstrated conclusively that the gerr cells of males can be so injured by allowin the subjects to inhale the fumes of alcoho that they give rise to defective offspring altho mated with vigorous untreated female The offspring of those so treated whe reaching maturity are usually nervous an slightly undersize. These effects are ap parently conveyed through the descendant for at least three generations. Such evi dence establishes at least the probability o the transmission of serious ill-effects t human offspring through alcoholic in dulgence of the male parent.

Much of the statistical evidence that ha been produced on both sides of this questio of the transmissibility of the effect of alcoho



THE EFFECT OF ALCOHOL ON TREATED GUINEA-PIGS AND THEIR DESCENDANTS

FIG. 1. On the left a non-inbred female, No. 803, with six of its eight great-grandparents treated with alcohol and only two on the paternal side not treated. She was small and degenerate and lived only one day. On the right is shown a normal animal born on the same day, the two being photographed on one plate.

FIG. 2. Two F_3 guinea-pigs born in the same litter from a normal father and a mother derived from four alcoholized grandparents. The albino female, No. 955, on the left, weighed at birth 90 grams, the small, defective male on the right weighed only 38 grams and died within two days; the sister is still alive. [CHARLES R. STOCKARD and GEORGE N. PAPANICOLAOU, *The Journal of Experimental Zoology*, Vol. 26, No. 1, May, 1918.]

is misleading unless very critically analyzed, but the results of exact laboratory experiments can hardly be gainsaid.

Stockard has continued his experiments and has lately reaffirmed his interpretation of the findings, summarizing them in the following table:

QUALITIES CONTRASTED BETWEEN THE NORMAL AND ALCOHOLIC PROGENIES

Qualities Measured	Normal	Alcoholic	Alc. Sup. + Alc. Inf. —
1. Size of litter.........	2.77	2.47	—
2. Failure to conceive...	4.45%	13.04%	—
3. Early prenatal death (size of litter, failure, etc.)	low	high	—
4. Proportion late prenatal death.........	51.92%	70.14%	
Post-natal mortality...	10.70%	10.60%	O
Total mortality.......	22.31% (100)	35.52% (189)	—
Abnormalities.........	O	2.52%	—
Oversize (+ 500 grs. at 3 mos............	5.57%	2.86%	—
Undersize (— 300 grs. at 3 mos.)..........	0.42%	1.34%	—
Late generations alcoholic improved, mortality index.........	22.31%	$F_1$42.40% to $F_4$17.14% ♀ ancestors	— —
Altered sex-ratios.....	109.60	86.50	—
Av. birth wt. of litter.	197.12	170.00	—
Av. individual birth wt.	77.16	70.35	—
Av. wt. 1 month old...	228.64	213.94	—
Av. wt. 3 months old..	425.11	404.13	—

Similar experiments by Raymond Pearl on omestic fowl have been interpreted as showg different results. That is, Pearl claims

that the administration of alcohol to the parents resulted in a selective elimination of the inferior germ cells and an improvement in the offspring. At least such experiments show that alcohol does reach and injure a certain number of the germ cells.

Taking all the factors into consideration, Stockard is of the opinion that there is a really close agreement between the results on fowls and guinea-pigs. He points out that as Pearl himself suggests, a larger administration of alcohol to the fowls would result not only in the elimination of weak germ cells but a considerable proportion of defective individuals would arise to be eliminated during various developmental stages or persist as degenerate specimens.

The fact that in Stockard's experiments the alcoholized parents showed no deterioration in health is explained partly by the peculiar method of administration, by inhalation, whereby the effects quickly passed off and the digestive system was spared any irritation. Great caution should be used in utilizing such data for the consideration of the alcohol problem in man. The effect of alcohol on conduct as well as upon the tissues must be considered. An animal protected in the laboratory may show no ill-effects from

a certain administration of alcohol, whereas the administration of a proportionate amount to a human being in society might well reflect on conduct from its influence on the brain and nervous system. Even an animal placed in its natural environment and occasionally alcoholized, as in Stockard's experiments, would obviously be handicapped in its struggle for existence.

There is great need to consider the alcohol problem in its totality as regards its effect on human beings and not reason from generalizations on partial data. This applies with equal force to both sides of the question so far as it is an academic question, but in so far as it is a medical question affecting the welfare of humanity, the benefit of any doubt should always be given to the individual and to the unborn child rather than to a mere indulgence.

Konrádi,[34] has found that comparatively few antibodies against cholera germs develop in persons who consume alcohol daily in fairly large quantities and who had been inoculated against cholera. Pampoukis has observed that alcoholics are not favorable subjects for inoculation against rabies. The Pasteur Institute in Budapest has made

similar observations, based on twenty-five years' experience.

The most recent authoritative scientific summary of the evidence relating to the effect of alcohol on mankind is the report of the committee appointed by the Central Control Board (Liquor Traffic) of Great Britain, headed by Lord D'Abernon,[35] and composed of eight other eminent educators, physiologists, pharmacologists, and psychiatrists.

The report issued in 1918 is entitled "Alcohol, Its Action on the Human Organism," and is extremely cautious and conservative in its tone, yet the following main conclusions were exprest:

"(*a*) That the main action of alcohol (apart from the effects of its continued excessive use) is confined to the nervous system;

"(*b*) That alcohol is narcotic rather than stimulant in action;

"(*c*) That its nutritional value is strictly limited;

"(*d*) That its habitual use as an aid to work is physiologically unsound; and

"(*e*) That the ordinary use of alcohol should not only be moderate, but should also be limited to the consumption of beverages of adequate dilution, taken at sufficient in-

tervals of time to prevent a persistent deleterious action on the tissues.''

The comments on the statistical aspects of the question were admittedly not exhaustive or of an expert character and the immense weight of testimony contributed by the medico-actuarial investigation of 43 American companies is wholly ignored.

The comment on the United Kingdom Temperance and General Provident Institution, the most important British experience, is confined to the figures 1848 to 1901.

In the light of the physiological evidence submitted by the committee it requires no prejudice against alcohol to discern in the higher death-rate of users of alcohol as compared to non-users, a consistent reflection of the influence of alcohol, direct and indirect, on body, mind and life.

The verdict of the profession most qualified to pass judgment on the matter, the medical profession, is no longer in doubt.

At the meeting of the American Medical Association held on June 6, 1917, Dr. Charles H. Mayo, the noted surgeon, in his presidential address stated that the only legitimate use for alcohol was in the arts and sciences, and that its use in medicine had become greatly restricted because other

less menacing drugs and remedial measures could be used instead. He stated that the advisability of national prohibition as a war measure was beyond discussion, and that the medical profession would welcome national prohibition. These expressions brought enthusiastic response from the assembled physicians, which left no doubt as to their sentiments.

At a later meeting the House of Delegates of the American Medical Association passed the following resolution:

"*Whereas,* We believe that the use of alcohol is detrimental to the human economy; and whereas its use in therapeutics as a tonic or stimulant or for food has no scientific value; therefore

"*Be it resolved,* That the American Medical Association is opposed to the use of alcohol as a beverage; and

"*Be it further resolved,* That the use of alcohol as a therapeutic agent should be further discouraged."

Entirely apart from moral grounds, the judgment of the majority of scientific men is against even the so-called moderate use of alcohol, and this judgment, long withheld through scientific conservatism, but now unequivocally and boldly stated by the dis-

tinguished surgeon who has received the highest mark of confidence that the medical profession can offer, should be accepted by the lawgiver, business man, and patriotic citizen who wishes to best serve his country with his total and maximum efficiency of mind and body.

That this was not merely the opinion of an individual or of a faction is shown by he presidential address of Dr. Arthur Dean Bevan before the association in June, 1918, n which he said:

"I want to plead for the united action of he organized medical profession of this ountry to secure protection by law against he injury that drink is doing to our people, ot as a political measure but as the most nportant public health measure that could e secured. In this crisis, when we and our llies are fighting not only for ourselves ut also for humanity and civilization, we nust organize the entire nation in the most fficient way possible, and this can not be one without eliminating drink.

"There can be no doubt of the injurious ffects of alcoholic drinks on both the hysical and mental well-being of our popu- tion. There can be no doubt that the reatest single factor we can control in the

interests of the public health of the nation would be the elimination of alcoholic drink.

"Each member of the medical profession, each county medical society, each State medical society, should take an active part in the propaganda against drink and secure national prohibition not years from now, but now, when it is so badly needed and will accomplish so much good not only for our boys in khaki and in blue, but for the nation in arms."

Major Lelean, R.A.M.C., whose book, "Sanitation in War," is a text-book in the British and United States medical schools, says:

"Alcohol should be forbidden on the march; it lowers blood-pressure and causes rapid heat production without corresponding tissue repair."

Last but not least, we have evidence from the battle front that our troops, trained without alcohol and fighting without alcohol, showed dash, initiative, and morale which has excited the admiration of the world.

The researches of Hardin and Silva also have lately shown that there are in fact no vitamins in beer, as has been claimed, and thus disappears another alleged "food value." Beer is simply booze, and it cannot

be shown to have any other claim on popular favor.

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SECTION VI

TOBACCO

It is the purpose of this section to present as fairly as possible the evidence relating to the effects of tobacco on the human body, so that those who smoke may correctly measure the probable physical cost of the indulgence. The extremes of opinion on this subject are well exprest in the following verses:

> "Hail! Social Pipe—Thou foe to care,
> Companion of my elbow chair;
> As forth thy curling fumes arise,
> They seem an evening sacrifice—
> An offering to my Maker's praise
> For all His benefits and grace."
>
> Dr. Garth.

> "A custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and the black stinking fume thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless."
>
> James I.

Tobacco is a plant, Nicotiana Tabacum of the order Solanaceæ, which includes Atropa Belladonna, or "Deadly Nightshade," Hyoscyamus, or "Henbane," Solanum Dulcamara, or "Bitter Sweet," all powerful poisons, and likewise the common potato and tomato, **What It Is**

which are wholesome foods. The cured leaves are used for smoking and chewing, or when powdered, as snuff.

History

Prior to the middle of the sixteenth century, the use of tobacco was confined to the American Indians. In 1560 the Spaniards began to cultivate tobacco as an ornamental plant, and Jean Nicot, the French Ambassador at Lisbon, introduced it at the court of Catherine de Medici in the form of snuff. Smoking subsequently became a custom which spread rapidly throughout the world, altho often vigorously opposed by governments. In the seventeenth century, in Russia, smokers' noses were cut off.

Composition

Tobacco contains a powerful narcotic poison, nicotin, which resembles prussic acid in the rapidity of its action, when a fatal dose is taken.

The percentage of nicotin present varies according to the brand and the conditions under which it is cultivated.

The following figures have been given by the various authorities:

London Lancet[1]	.64 to 5.3 per cent.
French Dept. of Agriculture[2]	.22 to 10.5 " "
Connecticut Agricultural Experiment Station[3] (Home grown—after fermentation.)	2.89 " "
U. S. Dept. of Agriculture[3] (Domestic.)	.94 to 5. " "

Aside from nicotin it also contains small quantities of related substances—nicotellin, nicotein, a camphoraceous substance termed nicotianin, said to give tobacco its characteristic flavor, and likewise a volatile oil developed during the process of preparation. On heating, pyridin (a substance often used to denature alcohol), picolin, collidin, and other bases are formed, as well as carbolic acid, ammonia, marsh gas, cyanogen and hydrocyanic acid, carbon monoxide (coal gas) and furfural. Furfural is a constituent of fusel oil, which is so much dreaded in poor whisky. The smoke of a single cigaret may contain as much furfural as two ounces of whisky.

The complex constitution of tobacco and the smoke from its combustion has caused much debate as to the substances that are responsible for its charm and its ill-effects, which are to be described. No one can doubt the serious injurious effects from such a powerful poison as nicotin if taken in any but the most minute quantities (one to three milligrams have produced profound poisoning in man).

It has been maintained by some that nicotin is practically destroyed in the process of smoking, and that the effects of tobacco

are limited to the decomposition products resulting from the burning tobacco, especially pyridin. But pyridin is also formed in the burning of cabbage leaves, yet cabbage leaves do not possess any attractions for smokers, neither do they produce the well-known effects that smoking and chewing tobacco produce. No doubt pyridin and furfural are factors in the drug effects of tobacco, but recent painstaking experiments by high authorities have shown the presence of nicotin in tobacco smoke, and when we reflect that there is sometimes sufficient nicotin in an ordinary cigar to kill two men, it is not strange that enough of it may be absorbed from the smoke passing over the mucous membranes of the nose, throat and lungs to produce a distinct physiological effect.

Investigators who claim to show by experiments the absence of nicotin from tobacco smoke must explain why the palpable effects of smoking, in those who have not established a "tolerance," are those of nicotin poisoning, and why the symptoms produced by chewing tobacco are identical with those following the smoking of tobacco, which are: mild collapse, pallor of the skin, nausea, sweating, and perhaps vomiting,

diarrhea, muscular weakness, faintness, dizziness, and rise in blood pressure followed by lowered blood pressure.

Nicotin is undoubtedly decomposed by burning, but it may become volatilized by heat and a certain amount absorbed before decomposition takes place.

Lehmann,[4] in 1908, found in tobacco smoke the following percentages of the nicotin contained in the tobacco:

Cigaret smoke................	82 per cent.
Cigar smoke................	85 to 97 " "

The London *Lancet*[5] (1912) gives the following figures:

Cigaret smoke..............	3.75 to 84 per cent.
Pipe mixture smoke, smoked as cigarets..............	79 " "
Pipe smoke................	77 to 92 " "
Cigar smoke................	31 to 63 " "

The United States Department of Agriculture[3] found in tobacco smoke about 30 per cent. of the nicotin originally present in the tobacco.

Contrary to general opinion, Havana cigars contain less nicotin than the cheaper brands. Many of the cheaper grades do, however, show a low percentage of nicotin.

By means of an ingenious apparatus, Zhebrovski,[6] a Russian investigator, compelled

rabbits to smoke cigaret tobacco for a period of 6 to 8 hours daily. Some died within a month, and showed changes in the nerve-ganglia of the heart. Others established a tolerance similar to that exhibited by habitual smokers, but upon being killed at the end of five months, degenerative changes similar to those produced by the injection of nicotin were found, *viz.*, hardening of the blood vessels. There is, indeed, no difficulty in producing the characteristic effects of nicotin by administering tobacco smoke, either in man or in animals.[7]

Effects on Animals and Man

Nicotin causes brief stimulation of brain and spinal cord, followed by depression. There is an increased flow of saliva, followed by a decrease (large doses diminish it at once) and often nausea, vomiting and diarrhea. The heart action is at first slowed and the blood pressure increased. Subsequently there is a depression of the circulation, with rapid heart action and lowered blood pressure. In habitual smokers this preliminary stimulation may not occur. The stimulating effect on the brain is so brief that tobacco can not properly be termed a stimulant. Its effect is narcotic or deadening. Those who fancy that their thoughts flow more readily under the use of tobacco

e in the same case with any other habitué
ıose thoughts can not flow serenely except
der his accustomed indulgence. That a
ınd, healthy man, who has never been ac-
stomed to the use of tobacco, can do better
ntal or physical work with tobacco than
thout it has never been shown. Indeed,
ch experiments as have been made on stu-
nts and others show to the contrary.[9]

The statistics presented by Prof. Fred. J.
ck,[8] of the University of Utah, are of in-
est in this connection.

In six educational institutions the students
npeting for places on the football team
re grouped as follows:

Institution.	Number Competing for Places.	Number Successful.	Per Cent. Successful.
ıstitution A.			
kers.............	11	2	18
-smokers.........	19	11	58
Institution B.			
kers.............	10	4	40
-smokers.........	25	17	68
Institution C.			
kers.............	28	7	25
-smokers.........	17	14	82
Institution D.			
kers.............	28	11	39
-smokers.........	15	10	67
Institution E.			
kers.............	10	7	70
-smokers.........	15	12	80
Institution F.			
kers.............	6	0	0
-smokers.........	26	15	58

'he following tables show the relative

scholastic standing of smokers and non-smokers:

SCHOLASTIC STANDING (Twelve Institutions)

Institution.	Smoker.	Non-smoker.	Institution.	Smoker.	Non-smoker
A	65.2	69.8	G	74.0	75.0
B	64.7	74.6	H	75.2	79.4
C	78.8	81.1	I	81.6	88.4
D	75.8	77.6	J	78.5	81.3
E	84.6	84.8	K	74.0	84.6
F	69.6	71.3	L	77.3	77.6

	Number of Men	Average Mark
Smokers	81	74.5
Non-smokers	101	79.4

Twelve institutions reporting:

	Number of Men.	Highest Marks.	Lowest Marks.
Smokers	81	4	12
Non-smokers	101	11	6

Number of Men.	Highest Marks.	Lowest Marks.
101 non-smokers	11	6
101 smokers	5	15

	Number of Men.	Total Conditions and Failures.	Average.
Smokers	82	70	.853
Non-smokers	98	43	.439

Prof. Pack's conclusions were as follows:

Tobacco Smoking Athletes

. Only half as many smokers as non-smokers are sucsful in the "try-outs" for football squads.

. In the case of able-bodied men smoking is associated h loss of lung capacity amounting to practically 10 cent.

. Smoking is invariably associated with low scholarship.

There have, of course, been many notable stances of high scholarship and prodigious ental achievement by heavy smokers. Such ceptions, however, do not affect conclu- ons derived from the study of average oups.

Hitherto figures on smoking and athletics ve been open to question because compari- ns were made between groups that are not necessity of the same physical and mental oe, having no important difference except the use of tobacco. But Professor Pack has ught to avoid this objection. As he points t, the football squad is probably as nearly omogeneous group as it is possible to find. seems reasonable to account for the in- rior physical and mental work of these rticular groups of smokers on the theory at in the main the well-known toxic effects tobacco are sufficient to create this differ- ce.

Dr. George J. Fisher and Elmer Berry in a series of careful tests found:

1. Cigaret smoking caused an increase in the heart-ra
2. Cigaret smoking maintained a blood pressure whic under the circumstances of the experiment, would oth wise have dropt.
3. Cigar smoking caused a considerable increase in hea rate and blood pressure.
4. In a number of instances, in the cigar test, the hea was unable to maintain, with a vertical position, the i creased blood pressure found in the horizontal positio showing a disturbance of the control of the blood-vesse This latter effect was more pronounced in tests taken non-smokers.
5. It was also noted that smoking was not conducive concentration upon the reading, which the men attempt during the tests.

Bush,[10] in a series of tests on each of 1 men in several different psychic fields foun the following conditions among smokin students immediately after the period smoking was completed:

1. A 10½ per cent. decrease in mental efficiency.
2. The greatest actual loss was in the field of im agery, 22 per cent.
3. The three greatest losses were in the fields of imager perception, and association.
4. The greatest loss, in these experiments, occurred wit cigarets.

Bush ascribed these effects to pyridin claiming that his experiments failed to re veal nicotin in the tobacco smoke, except i a very small proportion in that of cigarets

Tests for nicotin in smoke are beset with
iny difficulties and possible fallacies which
ve in the past misled investigators into
parently determining that tobacco smoke
itained no nicotin, but simply decomposi-
n products.

Pyridin is unquestionably present in to-
cco smoke, and is a poisonous substance,
ho less so than nicotin. It is not found,
wever, in chewing tobacco, and as the
iical effects of chewing tobacco are ap-
rently identical with those of smoking to-
cco, very strong and universally accepted
mical proof of the absence of nicotin
m tobacco smoke must be awaited before
epting such a conclusion.*

Jigaret smoking is a time waster; that is,
reaks up the power of attention, as few
okers are satisfied with one cigaret and
mere physical act of lighting a fresh
aret disturbs the continuity of thought
work. Dr. W. J. Mayo [11] calls attention
he fact that according to his observations
earch scholars who smoke cigarets have
done well.

Insurance Experience on Tobacco Smokers

nly one insurance company, the New
gland Mutual,[12] has published any ex-
ence on tobacco users. This covered a

*See (4), (5), (6) in bibliography.

period of 60 years and a body of 180,0
policyholders, as follows:

RATIO OF ACTUAL TO EXPECTED MORTALITY *

Abstainers.	Rarely Use.	Temperate.	Modera
Tobacco, 59 %	71%	84%	93%
Alcohol, 57 %	72%	84%	125%

* The standard here used is the American Experience T which is largely an artificial table upon which insurance miums are based, but which provides for a much higher tality than the average companies sustain. For example, actual mortality of the New England Mutual in 1913 was 57 cent. of the expected.

Interpretation

Fifty-nine per cent. of the expected m tality means that where, according to premium tables, 100 were expected to only 59 actually died.

The general class of risks in this compa were of excellent quality, as the figu show. Nevertheless, the abstainers hibited a far lower mortality than that perienced by the general class.

Dr. Edwin Wells Dwight, who presen the figures, urged caution in their interp tation, suggesting that the low morta among abstainers, both from alcohol and bacco, might well be due to a more conser tive habit of living. Furthermore, as the stainers from alcohol were not separa from the abstainers from tobacco in

alysis a perfect comparison can not be ıde; but our knowledge of the toxic effects both these narcotics and the preceding ıtistics of Doctor Pack justify us in asgning to tobacco a positively unfavorable 'ect.

Poisonous Effects

In experiments on animals nicotin exıcts from tobacco and inhalation of tocco smoke have produced hardening of the ge arteries. Clinical observation by some the world's best authorities indicates that same conditions are brought about in n by heavy smoking.[13]

Disturbance of the blood pressure, rapid ırt action, shortness of breath, palpitation the heart, pain in the region of the heart, important effects. Tobacco heart is often ıtly spoken of because the abandonment the habit will often restore the heart to normal condition, but tobacco heart somees causes death, especially under severe rsical strain or in the course of acute dise, such as typhoid or pneumonia. Surns[14] have noted failure to rally after ration in tobacco users, who are, of rse, deprived of their accustomed ingence immediately before and after operon. It is probable that many such cases s unrecognized, altho the alcoholic is

usually supplied the narcotic which his sy
tem demands.

Cannon, Aub, and Binger[15] have a
shown that nicotin stimulates the adre
glands, small organs adjacent to the kidne
which secrete a substance that in exc
powerfully affects the blood vessels, c
stricting them and temporarily increas
the blood pressure. This influence may
partly responsible for the change in
blood vessels noted in heavy smokers.

Excessive smoking is often an import
factor in causing insomnia.

Blindness or tobacco amblyopia, a form
neuritis, is not an uncommon affection am
smokers. There is also often an irrit
effect on the mucous membranes of e
from the direct effect of the smoke.

Catarrhal conditions of the nose, thr
and ear have also been noted.

Acid dyspepsia is a common affect
among smokers.

Few people realize that so many ingre
ents in tobacco and tobacco smoke are dea
poisons. Few people know that one drop
nicotin on the unbroken skin of a rabbit
produce death.[16] Two drops on the ton
of a dog or cat will prove fatal; moreov
fatal poisonings have occurred in man fr

wallowing tobacco and even from external pplication of strong solutions. A case was ecently reported from New Haven of fatal oisoning in a baby,[17] who had been fed rom a milk bottle and milk-mixture in which ome tobacco had been accidentally spilled.

Tobacco and the Soldier

One hesitates to say anything against to- acco as an indulgence for the soldier be- ause of its popularity with soldiers and he widespread campaigning for the tobacco und. No one would wish to deprive the oldier of a comfort or solace that will help im to keep his poise or to stand the long, ard strain of war. But we believe that the oldier is entitled to know the danger of obacco and that he should be warned of he price he may have to pay for his indul- ence.

Also there is a heavy responsibility in- olved in urging this habit upon men who re now free from it, and adding another nfortunate aftermath to the war. Those ho are not already smokers have no need f contracting the habit now.

Let us see what hard-headed veterans of he present war—active army surgeons who ave handled men at the front—have to say.

Major Lelean of the Royal Army Medical Corps, who has published the lectures delivered by him at the Royal Army Medical College recently, has this to say:

"To take now the next item that comes in the ration list—*tobacco.* The effects of smoking on the heart and on the quality of the pulse are well shown by pulse-tracings. Without going into the question of such various objectionable ingredients in tobacco as nicotine and the more harmful furfural, one may say that excess of smoking, particularly of cheap cigarets, produces rapid heart (tachycardia), muscular relaxation, and diminution of visual acuity. These conditions result in 'shortness of wind,'' which is bad for marching, and produce muscular tremor and loss of effective sight, which it need scarcely be said are worse for shooting. Tobacco, like alcohol, has certain compensating advantages. The mild narcotic effect of tobacco in moderation is not apparently attended by deleterious action on habitual smokers. Seeing that the allowance provides only two pipefuls a day, it can do a man no harm to smoke one pipeful when he reaches camp and the other just before he turns in at night; the soothing effect is then most beneficial."

But again he says regarding soldiers on the march: "Smoking should be forbidden; it causes thirst, tremor, and rapid heart."

In the London *Lancet* for August 18, 1917, are presented the results of experiments (by Capt. John Parkinson, of the Royal Army Medical Corps, and Dr. Hilmar Koefod, of Harvard, U. S. A.) on The Immediate Effect of Cigaret Smoking on Healthy Men and on Cases of "Soldier's Heart."

They say that in the present war heart disturbances characterized by breathlessness after exertion, pain in the chest, rapid, irregular heat action, giddiness and exhaustion are quite common.

In some cases valvular disease of the heart (V. D. H.) is found and the soldier is discharged, but in others no organic defect can be discovered, and these are classified in the Army Medical Service as D. A. H. (disordered action of the heart) and are termed "soldier's heart." The experimenters summarize their findings as follows:

"These observations show that, in health, the smoking of a single cigaret by an habitual smoker usually raises the pulse-rate and blood pressure perceptibly; and these effects are a little more pronounced

in cases of 'soldier's heart.' Moreover, the smoking of a few cigarets can render healthy men more breathless on exertion, and manifestly does so in a large proportion of these patients.

"Excessive cigaret smoking is not the essential cause in most cases of 'soldier's heart'; but, in our opinion, it is, in many cases, an important contributory factor in breathlessness and pain in the region of the heart."

The results of these experiments are in line with those reported by Dr. George J. Fisher (Secretary, International Committee Young Men's Christian Association) in his interesting book, "The Physical Effects of Smoking."

The experiments were made on fifteen young subjects, physical directors, in normal condition of health and engaged in vigorous exercise daily. Seven were non-smokers and eight were classed as "moderate smokers." The experiments covered investigation of the heart-rate after exercise and physical precision and accuracy in baseball pitching.

The various phases of the experiments established the following conclusions:

I. Smoking affects the heart-rate.

(*a*) The normal heart-rate of smokers is higher than that of non-smokers.

(*b*) Smoking causes a delay in the return of heart-rate to normal after exercise.

(*c*) The heart-rate was increased in 63 per cent. of the smoking tests. The average eart-rate at the end of fifteen minutes after smoking was 11.2 beats greater than the average normal heart-rate. In 97 per cent. of all the tests taken without smoking, the normal heart-rate returned, on an average, within five minutes.

II. Smoking causes loss in physical precision, and loss in accuracy of pitching a baseball.

(*a*) All smokers and non-smokers showed loss in physical precision immediately fter smoking.

(*b*) Smoking reduces accuracy in pitching baseball—and it would, of course, have the ame effect in pitching a bomb.

(*c*) In tests where there was no smoking, ll the men improved in accuracy of pitching.

In the accuracy tests of pitching, official ague baseballs were used; the target was block five feet square, with a bull's-eye ne foot in diameter, surrounded by concentric circles six inches apart.

After each man had smoked one cigar, the smokers lost 11 per cent. in accuracy when pitching, and the non-smokers lost 13 per cent.—the average loss for the two groups being 12 per cent.

After each man had smoked two cigars, the smokers lost 11 per cent. in accuracy and the non-smokers 18 per cent.—the average loss for the two groups being 14½ per cent.

When no cigar was smoked during tests, the smokers gained 9 per cent. in accuracy in pitching and the non-smokers gained 10 per cent.—the average gain for the two groups being 9½ per cent.

The average difference in score made by smoking one cigar was 21½ per cent., and by smoking two cigars the average difference was 24 per cent.

Recent experiments likewise have shown that the same harmful effects of smoking on accuracy of aim applies to rifle shooting.

These findings should be of especial interest to those in the armed service of the country, upon whose accuracy of throwing and shooting, and upon whose steadiness, their effectiveness as fighters so largely depends.

Naturally if the solace of tobacco will

keep a soldier from going insane or losing his control in short periods of strain, it might, in instances, prove a veritable medicine for some, but the average soldier should not have tobacco showered upon him without a word of warning as to its possible harmful effects on his heart and nerves. When tobacco is used at all, it should be with extreme caution and moderation.

SUMMARY

From the mass of evidence and opinion with which medical literature is loaded, a few salient facts stand out:

First: Tobacco and its smoke contain powerful narcotic poisons.

Second: It has never been shown to exert any beneficial influence on the human body in health, and it is not even included in the United States Pharmacopœia as a remedy for disease, notwithstanding the claims that are made for its sedative effects and its value as a solace to mankind. If these benefits are real and dependable, they should be made available in exact dosage and applied therapeutically. If they are not real and dependable in a medical sense, they are not real and safe as a mere drug indulgence.

Third: The symptoms following tobacco-

smoking are identical with the effects of tobacco-chewing among those not accustomed to its use; hence, any collateral psychic effect, such as the sight of smoke, the surrounding, etc., are of minor importance in establishing the habit. The main charm to the smoker is the drug effect, as in any other similar indulgence. Nicotinless tobacco is not popular, notwithstanding the efforts of the French and Austrian Governments to make it so.

Fourth: Fortunately, the sedative drug effect is so slight, as compared to that of other narcotics—opium, alcohol, cocaine, etc.—that the tobacco habit is less seductive and may be broken with comparative ease and is therefore less harmful morally. Men who have smoked or chewed steadily for 40 years have been known to give up the habit without experiencing much physical discomfort. Like any other habit, however, it may lead to increasing indulgence, and to an enfeeblement of will-power; this is a risk that the smoker takes just as does the alcohol user or the opium habitué who begins with so-called moderate indulgence.

Fifth: The well-known effects of tobacco on the heart and circulation should lead one

to pause and consider the possible cost of this indulgence, especially as—

Sixth: It is difficult to determine, years in advance, whether or not one is endowed with sufficient resistance to render so-called moderate smoking comparatively harmless.

Seventh: The vital statistics show that disease of the heart and circulation are rapidly increasing in this country in which—

Eighth: The per capita consumption has apidly increased in recent years, while—

Ninth: In the United Kingdom, where hese diseases are decreasing, there has een no material increase in the use of to-acco, and the per capita consumption is less han one-third that of the United States.

Increase of Smoking

In 1880 the annual per capita consump-ion of tobacco in the United States was bout 5 lbs., while in 1914 it had risen to ore than 7 lbs. In the United Kingdom the er capita consumption is about 2 lbs., and here has been no material increase in re-ent years.

The consumption of cigarets, in particu-r, has grown enormously, having more an doubled in the past five years, while ere has been a slight increase in the con-mption of cigars, smoking tobacco, chew-

ing tobacco and snuff, as shown in the following table:[18]

REPORT OF THE COMMISSIONER OF INTERNAL REVENUE

Withdrawals tax paid for consumption of manufactured tobacco products during the past five years

Fiscal year.	Cigars.	Cigarettes.	Tobacco, chewing and smoking.	Snuff.
	Number.	Number.	Pounds.	Pounds.
1913......	8,732,815,703	14,294,895,471	404,362,620	33,209,468
1914......	8,707,625,230	16,427,086,016	412,505,213	32,766,741
1915......	8,030,385,603	16,756,179,973	402,474,245	29,839,074
1916......	8,337,720,530	21,087,757,078	417,235,928	33,170,680
1917......	9,216,901,113	30,529,193,538	445,763,206	35,377,751
Total....	43,025,448,179	99,095,112,076	2,082,341,212	164,363,714

The quantity of leaf tobacco used in the production of tobacco, snuff, cigars, and cigarets for the past ten years has been as follows:

QUANTITY OF LEAF TOBACCO USED IN MANUFACTURING DURING THE PAST TEN CALENDAR YEARS

Year.	Cigars.		Cigarettes.		Tobacco and Snuff.	Total.
	Large.	Small.	Large.	Small.		
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
1907...	142,554,647	4,971,198	131,238	18,498,212	320,729,538	486,884,833
1908...	126,057,483	4,382,765	156,488	20,509,433	331,729,538	483,013,505
1909...	132,259,693	4,410,407	156,558	23,558,287	344,325,030	504,709,975
1910...	136,462,219	4,654,241	172,994	31,099,325	350,480,900	522,869,679
1911...	144,680,920	5,286,325	151,897	38,446,231	346,544,032	535,059,405
1912...	145,781,078	3,909,572	150,910	46,966,201	350,549,373	547,357,134
1913...	158,755,368	4,230,400	138,534	56,420,334	338,870,673	558,415,299
1914...	153,954,271	4,803,186	92,400	62,116,966	333,883,676	554,850,499
1915...	141,854,038	4,594,293	92,374	66,699,013	338,448,062	551,687,780
1916...	154,949,262	4,118,650	104,488	93,233,755	349,198,684	601,500,351

Tenth: The poetic effusions of the lovers of the weed are no safer guide than the exaggerated and intemperate pronouncements of people who have idiosyncrasies against tobacco and simply hate it.

Eleventh: Those who now smoke should have a thorough physical examination to determine the condition of the heart and blood vessels. This examination should be repeated at least annually, in order to detect any adverse influence on the circulation.

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SECTION VII

AVOIDING COLDS

Infection

BACTERIA play a part in most colds. In some cases there is a general infection, with local symptoms, as in grippe; in others there is a local infection, with mixed classes of bacteria. It is probable that these various forms of bacteria are constantly present in the nasal secretions, but do not cause trouble until the local resistance or the general resistance is in some way lowered.

Nasal Obstruction

In many, the susceptibility to colds is due to abnormalities in the nose or throat. Nasal obstruction is a very common condition. The nose, like the eye, is usually an imperfect organ. These obstructions are often the result of adenoids in childhood, which interfere with the proper development of the internal nasal structures. Malformation of the teeth and dental arches in childhood are frequent and often neglected causes of nasal obstruction. Such malformations are caused by the arresting of the growth of the upper jaw and nasal structures. Correction of the deformity of the arches often renders nasal surgery unnecessary. Such conditions no

nly predispose to colds, but increase their everity and the danger of complicating in-ection of the bony cavities in the skull that ommunicate with the nose. They also in-rease the liability to involvement of the iddle ear and of the mastoid cells which re located in the skull just behind the ear. he importance, therefore, of having the nose d throat carefully examined, and of hav-g any diseased condition of the mucous embrane or any obstruction corrected must apparent. All who suffer from recurrent lds should take this precaution before nter sets in.

General Resistance

If the nasal passages are put in a healthy ndition, strict obedience to the rules of in-vidual hygiene will almost wholly prevent lds. In fact, except where actual nasal de-ts exist, the frequency of colds is usually fair indication of how hygienically a per-n is living. The following points need ecial emphasis, tho they repeat in some es what has already been said in the text.

Skin Training

t is a familiar fact that exposure and lling will often produce a cold. This is ally due to the fact that the nerve centers trolling the circulation of blood in the n are over-sensitive, and exhibit a sort of r-trigger reaction to exposure, causing a

disturbance of the circulation, and of the heat-regulating machinery of the body of which the spongy shelf-like turbinated bones in the nose are an important part. Skin training, then, appears to be the first hygienic step toward establishing a resistance to colds.

Cool bathing, to a point that produces a healthy reaction, is another important feature of skin training.

Cold bathing, by those affected with kidney trouble, is not advisable, but delicate individuals, who can not react well to the cold bath, can greatly increase their resistance by graduated cool bathing performed as follows: Standing in about a foot of hot water, one may rub the body briskly with a wash-cloth wrung out of water a about 80 degrees F. and reduced day by day until it is down to 50 degrees F. Following this the cold douche or affusion may b taken (water quickly dashed from a pitcher beginning at 90 degrees F. and daily reduc ing until 50 degrees F. is reached, or jus before the point where an agreeable reactio ceases to follow.

(One should first accustom himself to gentle draft.)

Light Clothing

The wearing of loose, porous clothing, an

the air bath—exercise in a cool room without clothing—are also valuable measures in skin training. Very heavy wraps and fur coats should be worn only during unusual exposure, as in driving or motoring. Outer clothing should be adapted to the changes in the weather, and medium-weight underclothing worn throughout the winter season. Office-workers and others employed indoors are, during the greater part of the day, living in a summer temperature. The wearing of heavy underclothing under such conditions is debilitating to the skin and impairs the resisting power.

Overheated rooms should also be avoided or the same reason. In rooms where people re moving about, the temperature should ot be allowed to rise above 65 degrees. In rdinary offices or dwelling rooms, the temerature should not be allowed to rise above 8 degrees and adequate ventilation should e provided.

Fresh Air

Living out-of-doors, especially sleeping ut, gives the skin exercise, and further eeps fresh air in the lungs. It is one of the remost methods of prevention against lds. Army men remark that so long as ey are out of doors, even if exposed to d weather, they almost never catch cold,

but do so often as soon as they resume liv-ing in houses.

Long breaths taken slowly and rhythmic-ally, say ten at a time and ten times a day are helpful.

Constipation

Constipation predisposes to colds, and should be vigorously combatted by proper diet and exercise, and regular habits of at-tention to the bowel function.

Overeating

Overeating frequently leads to nasal con-gestion. Eat lightly, using little meat or other high protein foods such as fish or white of eggs, and thoroughly masticate the food.

Fatigue

Avoiding undue fatigue will help greatly in preventing colds.

Nasal Toilet

The regular use of nasal douches is not advisable. The mucous membrane of the nose is intolerant of watery solutions, and a chronic congested condition or even infec-tion of air cavities in the skull can be brought about by the constant use of sprays and douches. Where special conditions ren-der it necessary, these should be used only on the advice of a physician. When the nose is clogged with soot or dust, a very gentle spray of a warm, weak solution of salt and water, in the anterior nostrils, may do no harm. Picking of the nose should b

strictly avoided. This is probably a fertile cause of infection and is induced by a dry, overheated or dusty atmosphere. In blowing the nose care should be taken to close one nostril completely and to blow through the other without undue force. Otherwise, infection may be carried into the ear passages or the cavities communicating with the nose and give rise to serious trouble. When suffering from a cold, gauze or cheese-cloth should be used instead of a handkerchief and burned after use. Sneeze into the gauze, and thus avoid spraying infection into the surrounding atmosphere.

Emergency Treatment of Colds

After one has actually caught cold the rules above given for preventing a cold are in most particulars reversed. One should then avoid drafts, variable temperature and any severe "skin gymnastics." The paradox, that exposure to drafts is preventive of colds, but is likely to add to the cold after it is caught, is not more surprizing than the paradox that exercise keeps a man well, but that when he is sick it is better to rest in bed.

After a cold has actually been contracted, the great effort should be to keep all parts of the body thoroughly and evenly warm, especially the feet. To accomplish this it is

often the wisest course for one who has a cold to remain in bed a full day at the outset.

Medical treatment by a physician can considerably mitigate and shorten the duration of a cold and lessen the danger of complications, the symptoms of which can not always be appreciated by the patient.

Among the most effective home remedies for a cold are the hot foot-bath, 110-115 degrees F., a hot drink (*e.g.*, hot flaxseed tea), a thorough purge, and rubbing the neck and chest with camphorated oil. The hot foot-bath should usually last 20 minutes, and be taken in a very thorough manner, the body enveloped in a blanket. After taking the bath, the patient should go directly to bed, and not move about and neutralize its good results.

Another simple domestic remedy advocated in early stages of cold and even of influenza, is large doses of baking soda, a level teaspoonful about every hour.

A general neutral bath not above 100 or below 95 degrees is very restful to the skin and nerves. They are not forced to cope with temperatures above or below that of the body, since the neutral bath has the same temperature as that of the body. One can remain in such a bath even for hours, if one

has the time, but in getting out, it is very important to be in a very warm room and to dress quickly. In fact, there is very considerable danger of catching cold at this time if great care is not taken.

If one does not remain in bed, it is generally safer to keep indoors. The air of the room should be kept free from draft and should also be kept humidified, especially in winter when it is apt to be exceedingly dry. Either excessive dryness or excessive moisture is a strain on the mucous membrane, which is the directly diseased organ in the case of a cold. If the day is still and sunny, being out of doors, if one is well protected from any chill, may help to get rid of one's cold, but on a damp, windy day the chances are one will add to the cold.

As to eating, it is sometimes wise to fast absolutely by skipping a meal or two, using nothing but water or water with agar-agar, or food which has bulk but little food value, such as green vegetables, salads, or fruit. The common idea that one should "stuff a cold and starve a fever" is most erroneous and comes apparently from a misunderstanding of the meaning of this adage which, originally, it would appear, was not intended in the imperative sense at all, but as

follows: "If you stuff a cold, you will have to starve a fever."

It should be added that whisky and heavy doses of quinine are distinctly deleterious and should be avoided, as should all quack remedies and catarrh cures; there are more effective remedies which carry no possibilities of harm.

When one is getting over a cold it is a good time to resolve to avoid catching colds altogether, which for the average person can be substantially accomplished by following the above suggestions. The tax on one's time thus required is far less than the tax required by the colds themselves. The authors of this book know of persons who have scarcely lost a day's work from colds or other ailments for decades at a time simply by using a little self-control and common sense at critical times.

Studies connected with the epidemics of measles and pneumonia at the cantonments during the mobilization of our troops and further studies in connection with the terrible epidemic of Spanish influenza have served to emphasize the fact that respiratory troubles are spread and become epidemic chiefly through close contact with infected individuals.

There is no proof that these various types of organisms that are present in influenza and its complications are borne any great distance through the air. Such organisms do not long survive in air and sunlight. They must have a culture medium in which to exist and this is found in the air passages of human beings.

Influenza and pneumonia are crowd diseases. They are conveyed largely by the spraying of the secretion in coughing, sneezing, spitting and talking. During the autumn and winter months, people who are infected or in any way lowered in health, should avoid crowds, and those who are affected by colds or coughs should avoid sneezing or coughing in such a way as to convey infection. Sputum cups or gauze should be used for sputum and subsequently burned. A sneeze should always be caught in a handkerchief or some other receptacle. The habit of talking into people's faces should be strictly avoided.

In cases of acute illness with symptoms of grippe or pneumonia or other respiratory affection, the patient should be isolated and treated as having a communicable disease. It is well for the attendants in such cases to wear gauze masks made by tying several

thicknesses of gauze over the nose and mouth.

Preventive inoculation for certain types of pneumonia is regarded as having considerable protective value. Preventive inoculation with mixed vaccines for influenza and pneumonia is still in the experimental stage but is regarded by leading authorities as having some protective value.

There are, however, no magic cures or specific remedies for these troubles. The most effective protection is to build up the general health to a high point of resistance and the observance of the laws of winter hygiene such as outlined in this chapter with the special considerations as to the avoidance of crowds and of exposure to these spray-borne diseases.

Hay fever—It is now generally believed that so-called "Hay Fever," "Rose Cold," etc., is due to a condition of sensitization to certain forms of protein found in the pollen of certain plants and in horse dandruff and other substances.

Obscure forms of asthma may be due to sensitization to such substances and grave disturbance is sometimes caused by the protein of shell-fish. It is desirable to ascer-

ain by certain tests the kind of protein to which one is sensitized.

Desensitization can then often be accomplished by vaccination or a complete avoidance of such foods or pollen may be attempted.

SECTION VIII

SIGNS OF INCREASE IN THE CHRONI ORGANIC DISEASES

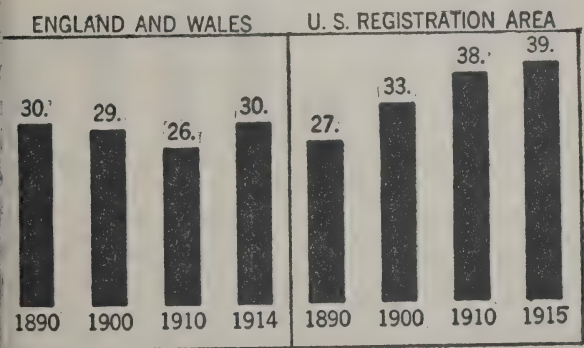
THE fact that in the United States the gen eral death-rate has steadily fallen for th past several decades, a phenomenon com mon to all civilized countries, is accepted b many as evidence of a steady gain in Na tional Vitality. That there has been a gai in vitality in the younger age groups is un questionably true, but this gain has serve to mask a loss in vitality at the older ag periods.

This latter phenomenon, a rising mortalit in elderly life, is something almost peculia to the United States. It is not exhibited i the mortality statistics of the leading Euro pean countries. In those countries the fa in the death-rate has not been due solely t a reduction of mortality in infancy an early adult life through the conquest of di eases of children, tuberculosis and oth communicable diseases. England and Wale Denmark, Norway, Sweden and Pruss show improved mortality at every ag period.

The charts in this section show the trend f mortality in the two great classes of dis-ases: the communicable, which affect more nphatically the young lives, and the chronic r regressive class of diseases, those affect-ng the heart, blood vessels and kidneys, hich affect chiefly those in middle life and ld age.

It seems evident that unless this increased ortality is due to some unknown biologic ıfluence or to the amalgamation of the arious races that constitute our popula-on, it must be ascribed, in a broad sense, lack of adaptation to our rapidly develop-ıg civilization.

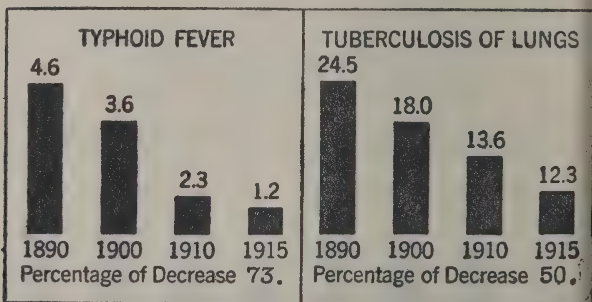
DEATH RATE PER 10,000 LIVING
HEART—BLOOD VESSELS—KIDNEYS



Whether or not there is one principa
cause that determines the unfavorable tren
of mortality in this country as compared t
other civilized nations has not yet been co
clusively shown.

The chart on page 379 shows that in th
United States registration area, the mortalit
from diseases of the heart, blood vessels an
kidneys increased 41 per cent. during th
period 1890-1910, while in England an
Wales during this period there was a de
crease in the mortality from these maladies

DEATH RATE PER 10,000 LIVING
TYPHOID FEVER AND TUBERCULOSIS OF LUNGS
U. S. Registration Area



* Since 1910 there is evident a rather sharp rise in Briti
mortality from these diseases. There is still evident, howev
a lowered general mortality at each age period of life in t
1910-1914 quinquennium as compared with 1905-1910. As figur
later than 1914 included the civil population only, and not t
millions of able-bodied men formally included in the populatio
but withdrawn for military service, they do not afford a val
basis for comparison.

Another disease apparently heavily on the
crease in all civilized countries is cancer.
The chart on page 380 shows the sharp
ownward trend of the most important com-
unicable diseases. Progress in medical and
nitary science and the development of
mmunity hygiene must receive the credit.
is in vivid contrast with the chart on page
9 showing the upward movement of mor-
lity in the chronic organic diseases of heart,
ood-vessels, and kidneys.

SECTION IX

COMPARISON OF MORTALITY TENDENCIES AMONG NATIONS

EXPECTATION OF LIFE FOR MEN AND WOMEN IN VARIOUS COUNTRIES

Note that in Sweden, Norway, Denmark, Netherlands, Italy and Australia, the expectation of life is greater at most age periods than in the United States. In the Scandinavian countries and Australia, the advantage amounts to several years or more at all but the extreme old ages.

Ages	Sweden 1901—1910	Norway 1901—1910	Denmark 1906—1910	E. & W. 1901—1910	Holland 1900—1909	Belgium 1891—1900	Germany 1901—1910	Austria 1900—1901	France 1898—1903	Italy 1901—1910	U. S. A. 1901—1910	Australia 1901—1910
Men												
Under 1	54.53	54.82	54.9	48.53	51.0	45.39	44.82	37.77	45.74	43.60	48.34	55.20
1	59.06	58.66	61.5	55.68	58.2	53.51	55.12	49.17	53.59	51.45	55.15	59.96
2	59.43	58.74	61.5	57.00	59.3	54.78	56.39	51.52	54.43	54.38	55.94	60.04
3	59.08	58.26	60.9	56.92	59.3	54.94	56.24	52.00	54.47	55.13	55.70	59.45
4	58.54	57.63	60.2	56.49	58.9	54.66	55.77	51.96	54.11	55.11	55.22	58.71
5	57.90	56.93	59.4	55.90	58.3	54.17	55.15	51.62	53.57	54.76	54.27	57.91
10	54.03	52.92	55.1	51.81	54.3	50.32	51.16	48.22	49.75	51.23	50.66	53.53
15	49.79	48.69	50.5	47.31	49.8	45.93	46.71	44.03	45.45	46.96	46.34	49.03
20	45.88	45.16	46.3	43.01	45.7	41.83	42.56	40.08	41.53	43.04	42.25	44.74
25	42.31	42.18	42.2	38.86	41.8	38.06	38.59	36.53	39.03	39.44	38.48	40.60
30	38.57	38.85	38.0	34.76	37.8	34.22	34.55	32.86	34.35	35.70	34.75	36.52
35	34.68	35.22	33.9	30.79	33.6	30.40	30.53	29.15	30.71	31.86	31.14	32.49
40	30.77	31.49	29.7	26.96	29.5	26.71	26.64	25.51	27.15	28.01	27.55	28.56
45	26.93	27.70	25.9	23.27	25.6	23.17	22.94	22.02	23.64	24.23	24.02	24.78
50	23.17	23.95	22.1	19.76	21.8	19.69	19.43	18.64	20.26	20.53	20.59	21.16
55	19.54	20.32	18.5	16.48	18.1	16.48	16.16	15.48	16.95	16.98	17.20	17.67
60	16.06	16.80	15.2	13.49	14.7	13.43	13.14	12.58	13.81	13.65	14.16	14.35
65	12.81	13.51	12.1	10.80	11.6	10.62	10.40	9.92	10.96	10.63	11.36	11.31
70	9.85	10.59	9.3	8.39	8.9	8.13	7.99	7.61	8.42	8.00	8.97	8.67
75	7.29	7.97	6.9	6.41	6.7	6.21	5.97	5.74	6.34	5.83	6.69	6.58
80	5.22	5.85	5.1	4.86	4.9	4.56	4.38	4.39	4.87	4.20	4.79	4.96
85	3.66	4.26	3.7	3.53	3.5	3.35	3.18	3.36	3.91	3.12	3.70	3.65
90	2.60	3.09	2.6	2.56	2.2	2.33	2.35	2.84	3.29	2.68	2.48	2.64

These figures were derived from Swedish Official Statistics.—Mortality of Life Extension Tables

Note that in Sweden, Norway, Denmark, Netherlands, Italy and Australia, the expectation of life is greater at most age periods than in the United States. In the Scandinavian countries and Australia, the advantage amounts to several years or more at all but the extreme old ages.

Ages	Sweden 1901—1910	Norway 1901—1910	Denmark 1906—1910	E. & W. 1901—1910	Holland 1900—1909	Belgium 1891—1900	Germany 1901—1910	Austria 1900—1901	France 1898—1903	Italy 1901—1910	U. S. A. 1901—1910	Australia 1901—1910
Women												
Under 1	56.98	57.70	57.9	52.38	53.4	48.84	48.33	39.87	49.13	44.39	51.92	58.84
1	60.64	60.81	63.2	58.31	59.5	55.88	57.20	49.31	55.84	51.40	57.69	62.89
2	60.95	60.87	63.2	59.58	60.6	57.13	58.47	51.63	56.63	54.39	58.34	62.95
3	60.58	60.38	62.6	59.49	60.5	57.36	58.33	52.13	56.63	55.20	58.02	62.34
4	60.03	59.74	61.9	59.09	60.0	57.01	57.87	52.09	56.28	55.21	57.57	61.60
5	59.40	59.04	61.1	58.53	59.4	56.54	57.27	51.78	55.75	54.91	56.86	60.80
10	55.58	55.08	56.7	54.53	55.4	52.78	53.35	48.54	52.03	51.52	52.92	56.39
15	51.48	51.03	52.4	50.08	51.0	48.50	49.00	44.56	47.90	47.41	48.55	51.86
20	47.66	47.34	48.2	45.77	46.9	44.44	44.84	40.78	44.02	43.63	44.46	47.52
25	43.93	43.82	44.1	41.54	42.8	40.70	40.84	37.22	40.51	40.06	40.63	43.36
30	40.20	40.24	40.1	37.36	38.8	36.96	36.94	33.70	36.93	36.46	38.86	39.33
35	36.38	36.61	36.1	33.31	34.8	33.18	33.04	30.17	33.29	32.78	33.13	35.37
40	32.53	32.92	32.0	29.37	30.8	29.46	29.16	26.64	29.60	29.03	29.38	31.47
45	28.64	29.16	28.1	25.53	26.9	25.68	25.25	23.05	25.86	25.21	25.63	27.59
50	24.74	25.30	24.1	21.81	22.9	21.87	21.35	19.40	22.14	21.31	21.95	23.69
55	20.90	21.52	20.2	18.27	19.1	18.22	17.64	15.93	18.52	17.51	18.40	19.85
60	17.19	17.85	16.5	15.01	15.5	14.78	14.17	12.77	15.08	13.95	15.12	16.20
65	13.69	14.38	13.0	11.99	12.3	11.61	11.09	10.02	11.97	10.75	12.12	12.88
70	10.53	11.24	10.0	9.25	9.4	8.87	8.45	7.65	9.21	8.02	9.51	9.96
75	7.81	8.49	7.5	7.10	7.0	6.73	6.30	5.86	7.00	5.84	7.20	7.59
80	5.64	6.28	5.5	5.36	5.2	4.91	4.65	4.47	5.38	4.22	5.18	5.73
85	4.02	4.55	4.0	3.94	3.7	3.61	3.40	3.67	4.39	3.21	4.06	4.19
90	2 91	3.34	2.9	2.94	2.4	2.65	2.59	3.08	3.84	2.83	2.82	2.99

ENGLAND AND WALES

Annual Standardized Death Rates, Death Rates at Twelve Groups of Ages, and Infant Mortality, 1841-1915*

Year	All Ages (Standardized)	Deaths per 1,000 Persons at Subjoined Ages												Deaths of Infants under 1 yr. of Age per 1,000 Births
		0–5	5–10	10–15	15–20	20–25	25–30	35–45	45–55	55–65	65–75	75–85	85 and upwards	
1841–45..	20.6	63.7	8.7	5.0	7.2	8.8	9.7	12.1	16.1	28.7	62.0	137.1	295.3	148
1846–50..	22.4	68.7	9.4	5.6	7.7	9.8	10.9	13.6	18.1	31.4	65.9	145.8	306.6	157
1851–55..	21.7	68.9	8.6	5.2	7.4	9.0	10.1	12.7	17.2	29.6	62.9	143.2	299.5	156
1856–60..	20.7	66.9	8.3	4.7	6.7	8.3	9.4	12.0	16.1	28.4	60.9	136.6	293.4	152
1861–65..	21.4	69.1	8.4	4.7	6.6	8.4	9.8	12.6	17.1	30.2	62.4	139.1	298.8	151
1866–70..	21.2	68.1	7.6	4.3	6.2	8.0	9.9	12.9	17.6	30.6	63.2	141.7	294.3	157
1871–75..	20.9	64.9	6.9	4.0	5.8	7.7	9.6	13.1	18.0	31.6	65.3	141.6	305.2	153
1876–80..	19.8	61.9	6.1	3.5	4.9	6.5	8.4	12.3	17.5	31.6	64.7	142.9	311.5	145
1881–85..	18.7	56.6	5.7	3.2	4.6	6.0	8.0	11.8	17.2	31.0	63.5	136.1	277.7	139
1886–90..	18.5	56.9	4.9	2.8	4.1	5.3	7.2	11.1	17.1	31.8	66.3	139.0	290.3	145
1891–95..	18.5	57.8	4.6	2.6	4.0	5.0	6.8	11.0	17.3	32.5	67.3	140.8	274.1	151
1896–1900	17.6	57.5	4.1	2.4	3.5	4.5	6.0	10.1	16.2	30.5	64.1	133.6	267.5	156
1901–05..	16.0	50.2	3.7	2.2	3.1	4.0	5.4	8.9	14.9	28.7	59.4	127.3	258.6	138
1906–10..	14.4	41.7	3.4	2.0	2.9	3.6	4.8	7.8	13.7	27.5	58.1	127.0	262.4	117
1910–14†	13.6	36.8	3.3	2.0	2.8	3.4	4.4	7.4	13.2	24.5	57.4	127.5	253.8	110

Note improvement since 1890 in death rate at every age period of life.

* Seventy-ninth Annual Report of the Registrar-General of the Births, Deaths, and Marriages in England and Wales, 1916, pp. 8-9.

† 1915 affected by withdrawal of military population.

EATH RATES PER 1000 OF POPULATION CLASSIFIED BY SEX, AGE, AND GENERAL NATIVITY, NEW YORK STATE: 1900 AND 1910 *

MALE

Age Period.	Native White.		Foreign Born White.		Colored.	
	1900 Death Rate.	1910 Death Rate.	1900 Death Rate.	1910 Death Rate.	1900 Death Rate.	1910 Death Rate.
l ages...	18.6	17.3	20.6	17.0	27.9	26.5
ader 1..	180.3	154.9	166.6	104.6	410.5	313.2
4......	23.0	17.5	31.6	21.7	57.0	46.6
9......	5.0	4.0	5.3	3.4	11.0	7.4
-14....	3.0	2.3	2.5	2.5	8.1	7.1
-19....	4.6	3.9	4.9	4.3	10.2	11.3
-24....	7.4	5.9	6.8	5.2	13.8	11.2
-29....	9.4	7.5	7.9	5.6	14.0	11.8
-34....	11.3	9.6	9.3	6.9	15.5	19.6
-39....	12.4	12.3	12.2	9.8	15.1	19.8
-44....	13.6	13.7	15.0	13.2	19.3	23.9
-49....	14.7	16.6	19.8	17.7	30.9	28.7
-54....	17.2	19.6	26.0	23.6	32.0	32.4
-59	22.3	27.0	34.3	35.4	43.8	45.3
-64....	31.0	37.4	43.4	46.9	40.5	57.4
-69....	46.3	53.5	61.9	65.6	72.4	76.5
-74....	67.5	72.3	82.2	85.2	90.2	77.5
-79....	109.4	118.1	119.4	115.7	125.0	130.6
-84....	156.1	163.9	182.4	190.7	163.1	163.5
-89....	243.8	246.0	239.0	243.3	122.8	183.7
& over.	366.7	394.9	351.0	367.6	280.0	263.2

Walter F. Willcox, Special Report on Vital Statistics, 33d ual report, State Department of Health, State of New York, 2.

FEMALE

Age Period.	Native White.		Foreign Born White.		Colored.	
	1900 Death Rate.	1910 Death Rate.	1900 Death Rate.	1910 Death Rate.	1900 Death Rate.	1910 Death Rate.
All ages...	16.1	14.4	19.7	16.2	24.7	21.7
Under 1..	149.7	128.7	160.1	92.0	335.6	265.0
1–4......	21.0	16.3	30.5	18.6	49.6	40.1
5–9......	4.8	3.8	5.0	3.9	10.1	8.6
10–14....	2.9	2.3	2.7	2.4	12.3	7.2
15–19....	4.5	3.2	3.6	3.2	8.8	9.7
20–24....	6.8	4.9	5.8	4.0	8.8	10.9
25–29....	8.1	6.1	7.6	5.3	10.1	10.4
30–34....	8.9	7.0	9.3	6.6	12.4	11.4
35–39....	9.3	7.7	11.0	7.9	15.1	14.3
40–44....	10.1	9.6	13.3	9.9	19.7	20.2
45–49....	12.4	11.3	16.9	13.5	19.1	20.8
50–54....	14.9	15.0	22.2	19.1	25.4	29.8
55–59....	19.4	19.8	31.3	28.8	39.3	36.4
60–64....	25.4	27.5	41.7	41.0	52.2	49.8
65–69....	38.2	42.7	57.0	59.4	62.0	69.6
70–74....	58.7	64.5	83.1	85.2	86.3	49.7
75–79....	93.4	96.0	117.5	115.0	110.7	96.0
80–84....	148.7	152.7	167.5	179.2	136.8	131.7
85–89....	224.2	223.9	246.9	242.1	117.6	175.8
90 & over.	326.4	339.0	355.0	348.5	183.3	222.2

The tables on this and the preceding page show the same general trend of mortality in New York State that is exhibited in the Registration States generally and wherever reliable statistics are obtainable. It will be noted, however, that there is little change in the mortality rate among women until age sixty, when a decidedly increased mortality rate is shown comparing 1910 with 1900. It will also be noted that this unfavorable trend in mortality in later life is manifested among native whites, foreign born and colored citizens alike.

COMPARISON OF EXPECTATIONS OF LIFE, NEW YORK CITY, ENGLAND AND WALES, AND LONDON

Ages	New York City † 1909–1911.		England and Wales* 1910–1912.		London* 1911–1912.	
	Males	Females	Males	Females	Males	Females
t birth	44.55	48.8	51.50	55.35	.....	.....
)	46.95	50.4	53.08	55.91	.....	.....
)	38.26	41.7	44.21	47.10	42.35	46.71
)	30.34	33.6	35.81	38.54	33.87	37.94
)	23.34	26.2	27.74	30.30	26.03	29.67
)	17.11	19.1	20.29	22.51	19.09	22.17
)	11.71	12.9	13.78	15.48	13.09	15.39
)	7.66	8.2	8.53	9.58	8.17	9.57
)	4.66	4.9	4.90	5.49	4.79	5.39
)	2.24	2.8	2.87	3.16	2.75	3.10

The above tables show, both among males and females, that the expectation life is greater at every age period in England and Wales and in London than New York.

* Supplement to the Seventy-Fifth Annual Report of the Registrar-General of rths, Deaths and Marriages in England and Wales. Part I—Life Tables, pp. –85.

†Annual Report, Department of Health, City of New York, 1912, pp. 176–177.

DEATH RATE PER 1000 IN PRUSSIA BY AGE GROUPS

1875–80 TO 1901–1910

ges	1875–1880.*		1881–1890.*		1891–1900.*		1901–1910.†	
	Males	Females	Males	Females	Males	Females	Males	Females
2...	71.8	69.1	70.2	68.0	58.0	55.5	45.3	43.1
3...	37.1	36.1	36.3	34.6	24.7	23.8	16.5	16.0
5...	22.2	21.7	20.8	20.7	14.2	13.9	8.9	8.8
10..	9.3	9.2	8.8	9.0	5.9	6.1	4.2	4.4
-15.	3.9	4.3	3.8	4.3	2.9	3.3	2.4	2.7
-20.	5.1	4.6	4.8	4.5	4.3	3.8	4.0	3.6
-25.	7.7	6.3	7.0	5.8	6.0	5.1	5.2	4.6
-30.	8.6	8.2	7.6	7.5	6.1	6.1	5.3	5.5
-40.	10.9	10.3	10.6	9.7	8.3	7.9	7.0	6.7
-50.	16.7	12.3	16.3	11.7	14.3	10.0	12.5	8.6

Continued on next page.

DEATH RATE PER 1000 IN PRUSSIA BY AGE GROUPS—Continued.

1875–80 TO 1901–1910

Ages	1875–1880.*		1881–1890.*		1891–1900.*		1901–1910.†	
	Males	Females	Males	Females	Males	Females	Males	Females
50–60 .	27.6	20.7	26.9	19.8	24.2	17.5	23.5	16.0
60–70 .	53.0	46.3	51.4	44.8	48.7	42.0	45.5	37.4
70–80 .	113.3	106.2	110.2	113.9	102.5	97.1	100.6	102.0
80 and over .	236.4	227.2	238.2	229.0	233.1	223.3	214.4	202.6

Note that in both sexes there was a steady and substantial decline in the death rate at all age periods of life after 1875.

**Königlich Statistisches Bureau in Berlin Preussische Statistik.* Hft. 184, p. iv. ff., Berlin.

†*Zeitschrift des Königlich Preussichen Statistichen Landesamts*, Berlin, 1912, p. xvii.

ATH RATE IN SWEDEN BY AGE PERIODS, 1816 TO 1910

MEN

ge	1816–40	1841–50	1851–60	1861–70	1881–90	1891–1900	1901–1910
5	57.3	52.55	55.52	54.3	41.68	35.87	28.04
10	7.9	8.17	11.05	9.2	7.73	5.87	4.03
15	4.6	4.50	5.70	4.4	3.89	3.43	2.92
20	5.5	4.80	5.65	4.8	4.52	4.66	4.57
25	7.7	6.94	7.68	6.8	6.53	6.69	6.45
30	9.7	8.03	8.36	7.3	6.72	6.60	6.19
35	11.6	9.73	9.87	8.1	6.81	6.70	6.04
40	13.6	12.44	11.71	9.7	7.70	7.57	6.63
45	16.7	15.42	14.69	12.0	9.43	8.77	8.04
50	21.2	18.85	18.36	15.1	11.54	10.68	9.89
55	27.0	24.60	23.54	19.8	14.56	13.66	12.80
60	34.2	31.15	30.28	26.8	19.73	18.47	16.97
65	45.5	41.30	41.21	38.4	27.70	25.89	24.15
70	64.0	64.33	58.51	55.1	40.96	39.03	35.88
75	96.2	90.66	89.44	82.7	64.31	60.18	56.08
80	136.3	136.87	133.44	125.7	102.71	99.04	91.18
85	204.9	222.46	192.44	187.1	164.77	161.53	146.88
90	293.7	328.53	292.09	285.6	247.45	245.24	228.45

WOMEN

ge	1816–40	1841–50	1851–60	1861–70	1881–90	1891–1900	1901–1910
5	50.8	45.89	48.97	48.8	37.07	31.58	24.24
10	7.4	7.32	10.28	8.6	7.59	5.94	4.05
15	4.5	4.30	5.22	4.1	4.12	3.78	3.39
20	5.1	4.75	5.19	4.4	4.54	4.75	4.73
25	6.4	5.63	5.84	5.4	5.29	5.72	5.55
30	7.9	6.37	6.83	6.1	6.07	6.12	5.99
35	9.3	7.87	8.38	7.1	6.61	6.52	6.13
40	10.8	9.56	10.03	8.4	7.45	7.19	6.69
45	12.6	11.30	11.55	9.9	8.17	7.86	7.23
50	15.1	12.54	13.13	11.2	9.02	8.56	8.24
55	18.9	16.99	17.08	14.6	11.19	10.88	10.10
60	25.7	22.97	23.49	20.6	15.33	14.22	13.51
65	37.2	32.90	34.49	30.8	22.81	21.13	19.46
70	55.1	52.87	51.63	46.4	35.59	33.40	30.23
75	84.4	80.12	79.97	70.4	56.20	54.03	49.30
80	120.9	122.86	120.05	110.2	89.59	88.29	82.32
85	180.3	193.20	172.17	169.3	141.19	140.79	133.61
90	269.1	292.97	253.40	252.5	216.78	217.20	205.47

ote the improvement in the death rate at every age period ife during the past century. This disposes of the theory that aving of mortality in the earlier age periods must be re- ed in an increasing mortality at middle life and later.

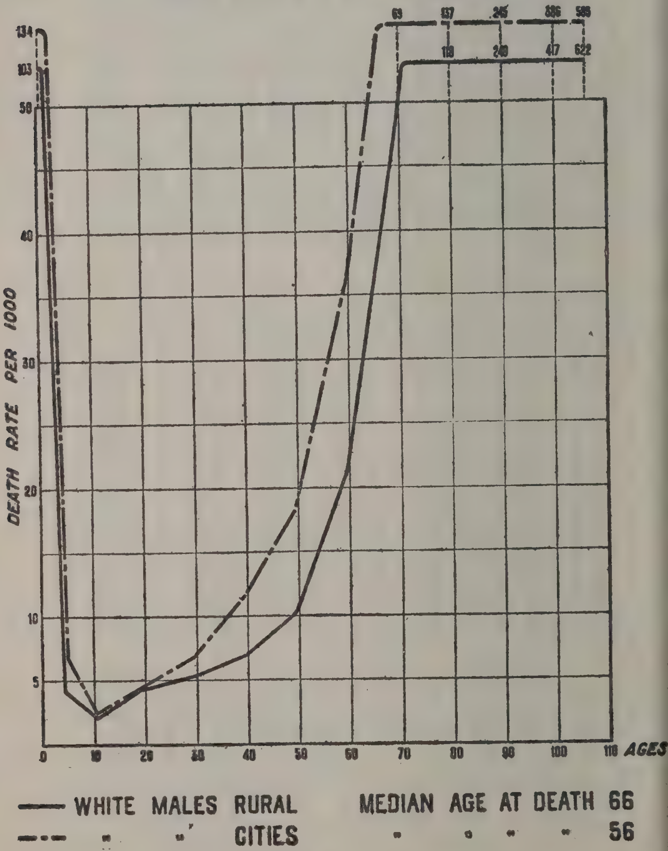
mong males the death rate at ages 0-5 in 1901 to 1910 as pared to 1816 to 1840 is reduced one-half; yet during same period the death rate at ages 50-55 was also reduced it one-half.

hese figures were derived from Swedish Official Statistics,— tality of Life Extension Tables for the Decennium 1901-) of the Royal Central Bureau of Statistics, Report to the g, Stockholm, 1916.

DEATH RATE PER 1,000 AT VARIOUS AGES OF WHITE MALES, CITIES AND RURAL DISTRICTS

ORIGINAL REGISTRATION STATES

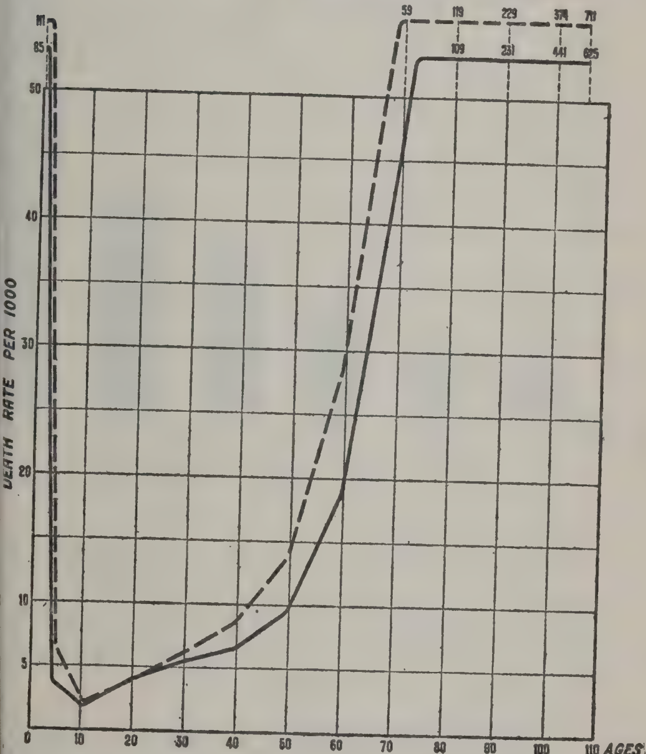
Derived from U. S. Census Life Tables 1910



DEATH RATE PER 1,000 AT VARIOUS AGES OF WHITE FEMALES, CITIES AND RURAL DISTRICTS

ORIGINAL REGISTRATION STATES

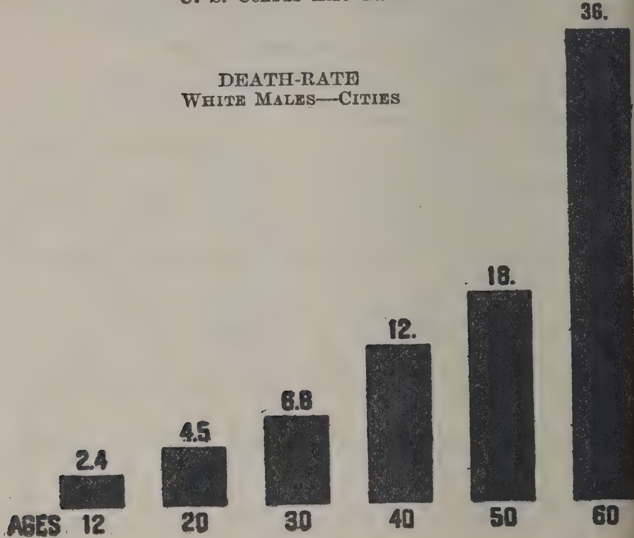
Derived from U. S. Census Life Tables 1910



—— WHITE FEMALES RURAL MEDIAN AGE AT DEATH 68

- - - " " CITIES " " " " 61

DEATH RATE PER 1,000 LIVING AT VARIOUS AGES
U. S. Census Life Tables 1910



69.	137.	245.	386.	585.	Death-Rate
70	80	90	100	106	Ages.

These charts show how astonishingly rapid is the loss of vitality after age 12 among males; in the cities, for example, the death-rate at 40 is more than double what it is at 20.

This increase in the death-rate with advancing years is not in accordance with a natural law but the result of various factors susceptible of important modification. While a certain amount of increase must

always obtain, nevertheless, science can do much to check the waste of vitality and especially that due to the increase of the chronic diseases which figure so prominently in the death-rate at middle life.

The rational method of attack on these diseases lies in periodic physical examinations and in the practise of personal hygiene after the particular needs of the individuals are thus ascertained. The chief factors in causing chronic diseases are the following, and a knowledge of these causes plainly points the way to their control, and to the application of the principles set forth in this book.

Causes of Chronic Disease, Premature Breakdown and Premature Death

Heredity	Mental inactivity
Infections	Physical inactivity
Poisons	Too much food
Mental strain	Too little food
Physical strain	Badly balanced diet

Accidents, injury

Some Current Views as to the Trend of American Mortality

The position that the Institute and others have taken with regard to the increase in mortality from chronic organic diseases and

the reflection of these conditions shown i the increased mortality at middle life an later in this country has, of course, been subject of some controversy in statistica circles. The weight of medical judgmen may be said to be wholly in favor of the In stitute's interpretation of the evidence it ha presented.

A number of statisticians accustomed t be skeptical with regard to any importan generalization of this character, especiall when based on United States Census data have rather strongly assailed the views ex prest by the Institute and its adherents.

The authors have held the view tha modern mortality, that is the mortality o the past ten or fifteen years, as compared t earlier periods, was less favorable at th middle ages of life and later. Any com parison with earlier records is, of course, t some extent hazardous because of the un satisfactory character of earlier records, ye by checking these earlier records in variou ways, a certain trend of mortality can b discerned.

The chief criticism directed to the evi dence presented by the Institute and other has been that the change in the classifica tion of diseases during the past ten or fiftee

years accounts largely for the apparent increase in the death-rate from these organic troubles. No evidence has yet been presented justifying such a thesis. By classifying the organic diseases in one group the changes in classification have been confined largely to that group and it is not possible, even by the most critical and conservative adjustment based upon these changes, to wipe out the increase in the mortality from these diseases shown by the census records even in the short period of time from 1900 to 1915.

One must still be cautious not to draw deductions as to the trend of the general death-rate from the analysis of separate statistics showing the death-rate from apoplexy, Bright's disease and heart disease, as some have done. There is only one safe and consistent way to study this problem and that is to group all these organic diseases into one class and follow them back through the records.

We have shown in the preceding section the results of such an investigation.

As there stated, the fact that this increase is numerically small when compared to the 100,000,000 lives in our population, does not stamp it as negligible or unimportant.

When contrasted with the heavy gains in vitality shown in England and Wales and other foreign countries not only at the earlier ages but at the later ages of life, this numerically small increase is found to be in a relative sense so important as to justify the claim that it is to a certain degree menacing; that is, this numerically slight loss is in such marked contrast to the mortality gains in England and Wales that it suggests the existence of a peculiar influence which should be sought for and combatted.

PERCENTAGE OF DECREASE IN DEATH RATE AT VARIOUS AGE PERIODS IN ENGLAND AND WALES, 1900-1914

Ages.....	0-5	5-10	10-15	15-20	20-25	25-35
%	38	19	12	16	26	29%
Ages.....	35-45	45-55	55-65	65-75	75-85	85
%	27	16	14	14	9	7.7%

1915 is not included here because of the withdrawal from the population of the men of military age and the inevitable disturbance of the age constitution, making comparison with earlier figures inadvisable.

Another point raised by people who have not critically studied these problems in all their relationships, is the possibility of the preservation of the unfit in infancy and youth increasing the death-rate in later

life. Some forget to take into consideration the fact that the fit as well as the unfit have been benefited and their death-rate improved by the advance in modern science. There has not yet been time in the United States for the reduction of the death-rate from communicable diseases to show itself in an increase later, the increase which we lay to the fault of the chronic diseases.

Finally, in Sweden, where the death-rate has been materially cut down at all ages and where there must necessarily have been a considerable saving among the unfit, no such influence is revealed.

Another interpretation of the reason for the increase in the organic diseases and in he death-rate at age periods of later life is, hat certain races represented in the additions to our population in recent years by mmigration have a high mortality from hese organic diseases. While such investigations have not covered the entire country, hey are important and suggest that such a actor is probably partially responsible for ncreasing the death-rate from these diseases and at the later periods of life, but hat it is wholly or chiefly responsible for his increase is a theory not supported by a ose investigation of the facts.

We have never promulgated the view tha this increasing mortality had attained th degree of an immediate national menac but we have temperately presented the ev dence and interpreted it as indicating danger for the future which should b guarded against. There is no possible dis pute as to the existence of widespread con ditions of impairment which should be co rected.

Influence of the War on Problems of Nation Vitality

The war has, of necessity, as pointed ou by Mr. Taft in the foreword of this boo concentrated attention on the subject of na tional vitality. The easy-going attitude the people characteristic of peace, when w are not called to measure our strengt against that of another nation, has give way to a stern and practical appraisemen of our physical assets.

The first direct lesson was derived fro the draft examinations. The following tab appears in the second report of the Provo Marshal General, February, 1919:

	Per Ce
Percentage of rejections by local boards in 1917...	29.
Percentage in 1918, groups B, C, D [Table 49]......	29.
Percentage of camp rejections of local board acceptances, 1917..............................	5.
Percentage in 1918 [Table 56]......................	8.

It will be noted that approximately one-third of the total number examined in the second draft were declined for active service for physical reasons. Examinations in the U. S. Navy and Marine Corps are even more emphatic in their testimony as to the degree of physical impairment that exists in the population. It must be remembered that even under the operation of the first draft many men were accepted with gonorrhea, syphilis, and other impairments, and treated at the cantonments. Owing to the modification of the regulations and the acceptance of other classes with remediable impairments, and the acceptance of a considerable number for limited military service, the rejections in later drafts fell to 0 per cent. This, of course, did not affect the actual conditions as regards the underlying ratio or physical impairment.

One of the authors, acting for a committee of the Medical Section of the Council of National Defense, made an investigation of a number of draft boards in order to ascertain the proportion of each type of impairment. The following analysis shows the result of this investigation. It squares so closely with the Provost Marshal General's report as regards total percentage of rejections, that the figures may be accepted as approximately reflecting

average conditions found throughout the country in all draft boards. The final report of the Surgeon General gives 28% as disqualified, but these are adjusted figures derived from the application of mathematical formulas and certainly do not reveal the full ratio of important physical impairment.

TABLE 1.—ANALYSIS OF SEVEN LOCAL BOARDS IN DETROIT, BROOKLYN AND NEW YORK

	Number	Percentage of Those Examined
Number of men called	8,875	...
Number of men examined	7,611	...
Number of men discharged for physical reasons	2,232	29
Prominent Causes of Rejection:		
Defective eyes	462	6
Defective teeth	366	4.8
Underweight	350	4.6
Hernia	223	2.9
Heart defect	184	2.4
Defective feet	180	2.3
Injured or amputated limbs	169	2.2
Ear defect	88	1.2
Tuberculosis of lungs	77	1
Tuberculosis of joints	2	...
Undersize	53	.7
Genito-urinary, bladder, etc.	37	.5
Varicose veins	35	.4
Overweight	32	.4
Syphilis	32	.4
Varicocele	28	.3
Deformity of trunk	38	.5
Asthma, bronchitis, etc.	21	.3
Mental and insane	14	.2
Debility and poor physique	16	.2
Miscellaneous injuries	15	.2
Hemorrhoids	13	.2
Kidney disease	10	.1
Rheumatism	8	.1
Miscellaneous defects	7	.1
Epilepsy	7	.1
Fistula	5	.06
Alcoholism	4	.05
Hydrocele	4	.05
Diabetes	4	.05

Goiter	6	.08
Deaf mutes	6	.08
Skin disease	4	.05
Liver and gallbladder	3	.04
Drug habit	3	.04
Injury to nervous system	3	.04
Kidney removed	2	.02
Neurasthenia	1	.01

In support of these figures we have he record of the United States Navy and Marine Corps where more rigid standards were applied than in the National Army.

NALYSIS OF PHYSICAL CAUSES FOR REJECTION FOR MILITARY SERVICE, U. S. NAVY AND MARINE CORPS, 1916 (Report of Surgeon-General)

	Number	Per Cent.
Number of applicants	113,932	
Number of men examined	82,592	
Number of men rejected for all causes	51,167	62
auses of Rejection:		
Eye	9,452	11.4
Underweight	5,397	6.5
Flatfoot	5,028	6.08
Defective teeth	4,878	5.9
Deformities	3,533	4.3
Varicocele or varicose veins	3,105	3.8
Heart affections	2,302	2.8
Height, under	2,124	2.6
Poor physique	1,633	2.0
Ear	1,376	1.7
Genito-urinary-venereal	1,347	1.6
Hernia or tendency to	1,312	1.6
Skin disease	1,094	1.3
Height and weight, under	921	1.1
Tuberculosis or suspects	909	1.1
Pyorrhea	896	1.08
Tonsillar conditions	588	.72
Genito-urinary, non-venereal	548	.66
Nasal abnormalities	476	.57
Febrile conditions	381	.46
Mental disorders	302	.36
Goiter or tendency to	294	.35
Defective speech	132	.15
Miscellaneous causes	2,820	3.41

Further confirmation is found in the analysis of the examinations by the Life Extension Institute of many thousands of supposedly healthy people taken at their work.

ANALYSIS OF TYPICAL INDUSTRIAL, COMMERCIAL AND INSURANCE GROUPS

(Figures derived from more than 10,000 cases)

	Industrial Men Av.Age 34	Industrial Women Av.Age 25	Commercial Men Av.Age 26	Commercial Women Av.Age 26	Life Ins. Av.Age 37
	%	%	%	%	%
No physical impairment—reported—no modification of living habits required	0	0	0	0	0
Slight physical impairment or defect requiring observation or hygienic guidance	10	23	10	12	6
Moderate physical impairment or defect requiring some form of hygienic guidance or minor medical, dental or surgical treatment	41	54	52	58	63
Moderate physical impairment or defect, medical supervision or treatment advised in addition to hygienic guidance	35	19	27	21	21
Advanced physical impairment or defect requiring systematic medical supervision or treatment	9	4	9	9	7
Serious physical impairment or defect urgently demanding immediate attention	5	0	2	0	3

The lesson from these figures is that there is a tremendous opportunity confronting those who have it in their power to guide and govern the people.

We had the national vitality required to win the war, but foolish optimism and national self-sufficiency is almost as menacing as timidity, discouragement and needless apprehension. We must bravely face our weakness and resolve to overcome it.

This means that we must reduce the 60 per cent. of preventable defects in the coming generation. We must individually and collectively apply the knowledge and the suggestions gained from this costly war in compensating, so far as may be, the damage wrought throughout the world.

A circular of instruction has been prepared by the Life Extension Institute stating the significance of the principal impairments that disqualify for military service and appealing to the patriotism of the rejected registrant to remedy or at least improve his condition as far as possible through proper hygiene or medical treatment.

This circular was placed in the draft boards by the Institute under the authority of the United States Public Health Service for distribution by the draft examiners to the men rejected for active military service.

It is hoped that knowledge of this nature, which was widely disseminated throughout

the country in connection with the draft, a matter upon which the minds of most families were focused, will have an important educational effect and stimulate the latter to health activities along the lines of prevention which will outweigh in value even the direct effect upon the registrants who received these pamphlets.

Perhaps we can bring home to the average mind the appalling losses of peace by contrasting them with those of war.

Losses in Peace

In a bulletin issued by the Illinois Life Insurance Company the following statement is made:

"The soldier's chances of surviving an entire year's war service are better than those of a young man of 20 surviving to 32 in time of peace; better than the chance the civilian of 25 has of reaching 36, or that the civilian of 30 will reach 41, or that the civilian of 35 will reach 45, or that one of 45 will reach 52, or that one of 50 will reach 56, or that one of 55 will reach 60, or that one of 60 will reach 63."

We feel a well-grounded apprehension regarding our friends and relatives on the fighting line, but have we in times of peace

felt any real doubt as to the ability, for example, of a son of 25 to attain the age of 35? Do we now feel any doubt as to the ability of a father at 60, well and healthy, to attain the age of 63?

These figures show us how heavy is the needless loss, and how failure to train and watch the human body is responsible for he peace loss in health and vitality. There s a daily battle going on with the forces nd agencies that menace us in our environnent. The horrors of military struggle ave revealed the losses we are sustaining rom this warfare. There are signs that we vill profit by this knowledge. The Governnent can do much, but in the final analysis it ests with the individual to apply the lessons et forth in this book, *i.e.*, periodic health exminations, not once in a lifetime, but yearly; pplication of the rules of hygiene based on he facts revealed by such examination; edical treatment if necessary, likewise irected with precision toward the correction f all defects and not to the mere alleviation f special symptoms or derangements.

In Great Britain only 36% of men of miliry age qualified for active service, showing e need for this corrective work among civized peoples.

Losses in War

Mr. Lawrence Cathles in an able paper read before the North Texas Underwriters Association, Dallas, April 13, 1918, has presented the following studies pointing out that great caution must be observed in estimating real war losses by exceptional instances of carnage:

"We have all heard of the eighteen survivors of the original Princess Pat Regiment of Canada, and the three French officers who now survive in active service out of sixty commissioned in one regiment during the early days of the war. Statistics show that out of the first division of Canadian troops consisting of about 22,500 men the death-rate during the ten months of actual service in the trenches was 120 per 1,000 for officers and 90 per 1,000 for non-commissioned officers and men; but these figures are as little to be relied upon in estimating the average death-rate as the figures given me just the other day by a Dallas man now in France who stated that out of 140 men in his company there were 90 casualties in one action which apparently lasted for only a few hours.

"Recent figures given in the Congressional Record indicate the following death

rates for the first three years of the present war:

Great Britain	33 per 1000 per annum
Austria	50 " " " "
Germany	70 " " " "
France	80 " " " "

"My own impression from a study of all the statistics which I have been able to obtain is that the general average death-rate in the British Army has so far been in the neighborhood of 45 per 1,000 per annum."

ANNUAL DEATH RATE PER 1000 FROM BATTLE AND DISEASE IN PREVIOUS WARS *

		Battle	Disease
Crimean War	English	69	230
	French	70	341
	Russian	120	263
Civil War	Union	33	65
	Confederate	47	94
Franco-Prussian War	German	55	24.5
	French	67.5	140
Anglo-Boer War	English	12.5	25.5
Russian-Japanese War	Russian	35	13.5
	Japanese	54	25

* Major Duncan (Journal Military Service Institute, 1914, vol. 54, pp. 141-177.)

The above figures represent a careful searching of the data by Major Duncan, yet all such figures must be open to some doubt as to absolute accuracy.

The Russian figures, which show conditions more favorable than the Japanese, have been questioned, especially as we have reason to believe that the sanitary and medical control

in the Japanese Army was in many respects singularly efficient.

If the Japanese Army had been on the same favorable dietetic *régime* as the Japanese Navy, the sick-rate would doubtless have been much lower. It is a curious fact that the Japanese Navy was under the counsel of British advisors while the Japanese Army derived its inspirations from German sources and this seems to be one instance, at least, where German science was at fault. The dietetic insufficiencies of the Japanese Army occasioned a very heavy and needless morbidity and mortality from beri-beri.

Major Louis L. Seaman, who closely studied these matters during the Russian-Japanese war, has given the following figures with regard to Japanese mortality, furnished directly by the Japanese War Office, which should be considered in relation to the other tables submitted:

Killed in action	7.32%
Died of wounds received in action	1.51%
Wounded in action	24.27%
Other wounded (accidents, etc.), and sick	27.11%
Died from disease (not including infectious and contagious diseases)	1.24%
Contagious diseases	1.93%
Died of infectious and contagious diseases	0.76%
Number never wounded or sick during war	35.86%
Total	100%

Major Seaman calls attention to the fact that at Port Arthur there was a heavy morbidity and non-effective rate in both armies because of entirely opposite dietetic deficiencies,—the Russians suffering from lack of vegetable foods and the Japanese having a too narrow diet of polished rice; a severe commentary on human ignorance of how to live. The Japanese sought diligently for an infective agent and cause for the scurvy from which the Russians suffered but have since, of course, learned that both scurvy and beri-beri are deficiency diseases and have, accordingly, corrected their diet, and eliminated beri-beri from both army and navy.

The following is the circular prepared by the Life Extension Institute and issued by the United States Public Health Service for instruction of men physically disqualified in the draft examination:

If you are specially classified or are not available for military service for physical reasons, you are urged carefully to note the suggestions given for improving your condition.

Consult a competent physician or dentist, according to your needs. Hospitals, dispensaries, local Health Departments and the United States Public Health Service are also sources of information and possible relief. If you are in a deferred group for physical reasons and not declined, report to your local board before having any radical operation and secure information as to the best course to pursue.

You owe it to yourself, to your family, and to your coun-

try, to place yourself in good physical condition for whatever service you can perform, whether military or civil.

Many men have a number of defects apart from the main disqualifying defect. All defects should have attention.

The following are the common causes for rejection or for special classification:

Defective Eyesight.—Be sure that your vision is corrected by properly fitted glasses. Have this done by an eye specialist, eye dispensary, or eye hospital. Do not try to fit cheap glasses to your own eyes. Eye-strain from badly fitting glasses may in time seriously affect your eyesight or health.

Teeth.—Decayed roots, infected gums, decayed teeth, irregular teeth which can not grind may cause many forms of serious disease, and should have immediate attention. Artificial teeth or bridges should be secured if the grinding teeth are missing, for if you do not properly chew your food your health may be affected. Brush the teeth thoroughly at least twice a day. If you have defective teeth or much gold work or many fillings in your mouth, *X*-ray to discover possible root infection is a wise precaution, especially if you have rheumatism or any joint trouble, for which other causes can not be found.

Feet.—Aside from paralysis, clubfoot, or deformities resulting from injuries, etc., most foot troubles are due to improperly fitting shoes, improper position in walking or standing, lack of exercise, and weakness of the muscles in the forepart of the leg that support the arch of the foot. Properly fitting shoes, of correct shape, with a straight inner edge (the Munson Army last is a good style) will help to correct weak-foot, bunions, corns, callouses, and painful joints. Exercise the toe muscles by working the toes up and down over the edge of a thick board, 30 times daily. Stand with feet parallel and somewhat apart with great toes firmly gripping the ground. Without bending the knees or moving the feet rotate the thighs outward repeatedly. This is chiefly done by strong contraction of the great muscles of the back of the thigh and seat. Improve your general health; take general exercise to strengthen your body. Bathe the feet daily. See a surgeon if these simple measures are not sufficient. The arches found in the shops will not correct flat-foot. They merely act as crutches. Hammertoe, bunion,

and many other defects can be corrected by a surgeon. Painful feet may be due to infection in tooth sockets or tonsils—search for such conditions should be made. Mere flatness of the foot without pain or other deformity may be of no importance.

Underweight.—Underweight is often due to irregular habits of eating and sleeping and lack of regular exercise. Have a thorough examination at intervals by a competent physician, or in dispensary or clinic, to determine whether or not any serious disease exists (especially hookworm or tuberculosis). Eat freely of fat-forming foods mentioned in next paragraph.

Overweight.—Secure as much regular exercise as possible. Be thoroughly examined for evidence of disease. Extreme overweight, especially at middle life, produces as high a death-rate as heart disease. Cut down the fat-forming foods, such as bread, butter, cereals, sugars, fats, and substitute more green vegetables and fruits.

Hernia or Rupture.—Operation is often advisable. Consult a competent surgeon and confer with your local board.

Piles, Hemorrhoids.—These are often caused by constipation and lack of exercise. Do not use drugs or purgatives. Plenty of bulky food, bran bread or biscuits, fruits, lettuce, spinach, cabbage, brussels sprouts, carrots, turnips, celery, tomatoes, salsify, onions, parsnips, and oyster plant will tend to correct constipation.

If piles are severe operation will help, but the original cause should be removed by proper diet. Agar-agar harmless, and not a drug, can be had at any drug store. Take a teaspoonful three times a day.

Varicocele.—If severe enough to cause rejection operation may be performed. Upbuild general health by exercise and nourishing diet and fresh air. A suspensory bandage is often required.

Varicose Veins.—Support by bandage or stockings. At times removal by operation. (Great caution necessary, consult your board.

Bladder, Kidney, Urinary Troubles.—Go to your physician or to a clinic and place yourself under careful medical supervision. Regulation of your diet, work and activities may be

all that is necessary, but your condition should be watched from time to time. Albumin in the urine may be temporary but should always be followed up and examinations made at intervals. Give the benefit of the doubt to your kidneys, and live a temperate and healthful life, avoiding stimulants, excess of meat and overeating generally. Be examined periodically. Sugar in the urine calls for careful medical supervision and regulation of diet and periodic examination by a physician.

Discharge from Ear: Ear Trouble.—See an ear specialist or go to an ear clinic. Do not neglect such a condition, which may infect other parts of your body.

Heart Murmurs: Heart Affections.—A man with an imperfect heart may not be fit for military service, but with proper regulation of diet, exercise, work and rest, his heart may carry him to old age. Avoid stimulants and tobacco, be very temperate in the use of tea and coffee, avoid excesses of all kinds; eat moderately; avoid heavy meals at night; get plenty of fresh air; exercise daily in the open but be careful not to overfatigue your heart or circulation—walking and gentle hill-climbing are good, but never when they cause pain in the chest or shortness of breath. Avoid dissipation and undue excitement. If there is breathlessness, dropsy, or dizziness, careful medical supervision is necessary. All damaged hearts should be examined at least once a year by a physician and the condition noted. Irregular action of heart in some cases is of little importance; in others it is serious and medical observation is important to settle this.

High Blood Pressure.—This may be temporary but should be watched and life regulated as above, especially avoiding physical and mental over-strain and dissipation. Eat little meat; avoid stimulants, tobacco, and overeating.

Lung Troubles.—Where there is suspected tuberculosis consult a competent physician and follow orders strictly. The basis of treatment is abundant fresh air and nourishing diet, such as bread and butter, cereals and fats, but do not neglect green vegetables and fruits. Avoid alcohol and tobacco. Do not take patent medicines or advertised remedies, or patronize advertising quacks. Avoid fatigue, or physical and mental strain. Do not take any chances. Re-

port to the health officer or Health Department of your district. They will be glad to counsel you.

Rheumatism.—This may be caused by infection in tonsils, teeth, nasal cavities, or elsewhere. Liniment will not cure it. Be examined by a physician and dentist and have infection removed.

Syphilis — Gonorrhea.—Thoroughgoing, persistent treatment is necessary for your protection and for the protection of the members of your family as well as that of your community. In large cities, clinics for the treatment of these diseases are available for those without funds.

Alcohol.—Alcohol as ordinarily taken is not a stimulant but a depressing drug. Your brain and nervous system govern your body. Alcohol not only reduces the efficiency of a nation, but life insurance experience has shown that the death-rate among steady drinkers supposed to be temperate —even within the bounds of so-called moderation—is nearly double that among average people.

Drink may lead you into trouble, possibly to a miserable death.

Why deliberately expose yourself to this sort of machine-gun fire?

Nervous and Mental Diseases.—Such conditions should be closely observed by your physician or at some clinic for nervous diseases. Some nervous diseases are due to bad mental habits, to fear, failure to take a courageous grip on life and forget one's troubles. Many nervous diseases are caused by physical conditions which should be sought for and cured by a thorough medical examination and treatment.

Miscellaneous Conditions.—Nose and Throat Trouble; Gall Bladder Trouble; Chronic Appendicitis; Skin Affections.—All such conditions should have immediate medical investigation. If you have no family physician, or if your means are limited, seek hospital or dispensary treatment.

Do not go through life with handicaps that may be easily removed. Do not shorten your life, reduce your earning capacity and capacity for enjoying life, by neglecting your bodily condition.

While other men are cheerfully facing death for the cause

of liberty, do not shrink from facing a little trouble and expense to make yourself strong and healthy and fit.

"It is not an Army We Must Shape
and Train for War; it is a Nation."
—Woodrow Wilson.

ADDENDA

This pamphlet has since been issued for civil distribution by the U. S. P. H. Service under the title, Keep Wel No. 1—The Road to Health.

RECENT MORTALITY CHANGES

Bearing on the question of the trend of mortality discussed in this chapter, the United States Bureau of the Census in a recent bulletin (January 31, 1922), announces tha Life Tables prepared for 1890, 1900 and 1910 show no improvement in mortality at ages over 40, and in some instances an increased mortality. There is also an increas in the death rates from circulatory and kidney diseases i the decade 1900 to 1910. A subsequent bulletin (Februar 21, 1922) called attention to the low death rates in 1920 a compared to 1910, affecting all age periods, and also a decrease in the death rates from diseases of the heart, bloo vessels and kidneys. Caution is necessary in making thes comparisons of one census year with another. An enormou rise in mortality in the year 1918, caused by the epidemic o influenza and pneumonia, may be the cause for the subsequent abrupt and extreme drop in mortality in the year 1919 and 1920. A weeding out of the impaired lives throug the epidemic would naturally result in a downward curv of mortality from organic affections. It is notable that u to the year 1918 there had been a decided upward trend i the mortality from these diseases so prevalent at middle lif and later. Time will tell to what extent the factors name have been influential, and whether or not there has been an change in the underlying mortality situation.

SECTION X

EUGENICS

"How to Live" deals mainly with individual hygiene, that is, the proper care of the individual. Hygienic improvement is limited, however, to the attainment of the best of which an individual is capable. Eugenics deals with the even more vital subject of improving the inherent type and capacities of the individuals of the future. It has been but briefly touched upon in this volume.

Eugenic improvement is attainable through the control of heredity. By heredity is meant the action of elements which control the development of the individual, and determine his constitution or makeup. The laws of Nature governing this action are now known in part, so that advantage can be taken of them to bring about the hereditary improvement of the race, generation by generation.

What Eugenics Is Not

Eugenics is not simply sex hygiene, as many have come to consider it, owing to the liberal use of the word Eugenics by the sex hygienists. Sex hygiene is, of course, one

of the considerations in eugenic improvement.

Nor is eugenics the science of improving the physical organism only, as has been erroneously assumed by certain uninformed publicists, a point of view which has been promoted by cartoonists, who find it good sport for their pens.

Eugenics does not require the old Spartan practise of infanticide, nor does Eugenics propose to do violence in any other way to humanitarian or religious feeling.

Eugenics does not mean, as some have imagined, compulsory or government-made marriages.

Nor is Eugenics the science of improving the human stock by matings that are academically ideal, but which lack the element of individual attraction and instinctive love.

Discovery of Hereditary Laws

There was a time when it seemed impossible to explain the inherent personality of a man, the color of his eyes, the capacity of his mind, the quality of his character. In attempting to trace the source of a personality, hereditarily, no constancy could be detected in its relation to the lives from which it arose. A child was never absolutely like brother, sister, mother, father or grandparent.

An epoch-making discovery in 1865 by an ustrian monk named Mendel,[1*] the importnce of which was overlooked until recently, ogether with later discoveries by a number of other scientists, revealed the subivisibility of each individual into many disnct units or traits, the hereditary sources f which were clearly traceable, leading to arious individuals of the family line, and ot to one individual alone. Furthermore, was found that the lack of a certain trait ometimes appears as a trait in itself, just s darkness seems like a condition in itself ther than as an absence of light.

These discoveries changed the whole curnt of thought regarding heredity, and the nstancy of its action, as well as its conollability. It also emphasized the fact at it does make a difference whom one arries as to the character of the resulting fspring. Their makeup is not subject to e caprice of forces beyond human perption, but is in some degree subject to ntrol.

Out of these discoveries has arisen the al science of Eugenics, altho Sir Francis lton, of England, had already started a

The notes ("1," etc.) refer to the publications listed at the e of the section.

movement for the conscious betterment o the human stock. He may be called th founder of Eugenics.

Rules of Eugenics

In view of the known laws governing th inheritability of unit-traits, the following i good advice to young men and women:

1. Learn to analyze individuals into thei inheritable traits—physical, mental, an moral.

2. Differentiate between socially noble an ignoble traits, between social and educa tional veneer and sterling inherent capacity

3. Do not expect physical, mental an moral perfection in any one individual, bu look for a majority of sterling traits.

4. Observe the presence or absence c specific traits in individuals at all ages c successive generations and fraternitie (brothers and sisters) of a family line.

5. Learn how to estimate the inheritabilit of such traits in a family line, upon specif mating with another family line.

6. When you marry, join, if possible, you family line to one which is strong in respe to the traits in which yours is weak.

7. But remember also that injuries can l inflicted on offspring by unhygienic living.

Some of the characteristics in Man's com plex known to act hereditarily and to l

raceable to distinct sources on family lines are as follows:[2]

Inheritable Traits

Physical Traits.—Character of the facial features, color of the eyes, hair and skin, stature, weight, energy, strength, endurance, quickness, commanding presence, vivacity of manner, general bodily soundness; also defects of many kinds, such as those of the nervous system, of the speech, eyes, ears, skin, also baldness, defects of the muscular system, blood, thyroid glands, vascular system, respiratory system, digestive system, reproductive organs; also defects and peculiarities of the skeleton, etc. This does not mean that all shortcomings are inherited. It does mean, however, that the type of organism is inheritable which lacks resistance to the germs and other precipitating factors in bringing about the shortcoming.

Mental Traits.—Among the mental characteristics known to arise from traceable hereditary sources may be mentioned factors in musical ability, artistic composition, literary ability, mechanical skill, calculating ability, inventive ability, memory, ability to spell, fluency in conversation, aptness in languages, military talent, acquisitiveness, attention, story-telling, poetic ability; and, on the other hand, insanity, feeble-mindedness

of many types, epilepsy. These are suggestive of the inheritability of many other mental traits not yet studied.

Moral Traits.—Among the moral traits known to possess inheritable elements are generosity, piousness, independence, industry, will-power, faithfulness, fairness, sociability, reliability, self-reliance, perseverance, carefulness, impulsiveness, temperance, high-spiritedness, joviality, benignity, quietness, cheerfulness, hospitality, sympathy, humorousness, love of fun, neighborliness, love of frontier life, love of travel and of adventure. The same may be said of immoral traits, such as criminality, pauperism, delinquency, irascibility, lying, truancy, superstition, clannishness, secretiveness, despondency, slyness, exclusiveness, vanity, cunning, cruelty, quickness to anger, revengefulness, etc.

Distribution of Traits

These physical, mental and moral peculiarities are not scattered evenly through the population, but exist on certain family lines only.

For instance, one-tenth of the deaths that occur in the United States are from tuberculosis. But this does not mean that one-tenth of every family dies of the disease. On the contrary, some families lose more

han half their numbers from it, while ther families lose almost none at all. 'he 10 per cent. is simply the average of ll. The percentage is high among the rish, and low among the Jews. Life inurance companies take consideration of is fact in examining applicants for inurance. A family history of tuberculosis ounts against even a healthy applicant, ot because of a belief that tuberculosis directly inheritable, but because nonesistant types, especially the light-weight pes, are known to be transmitted. A rofound influence toward checking this alady would evidently be exerted if the atings on the family lines exhibiting the aracteristic of susceptibility were to ase, and thus the perpetuation of susptible types checked.

The same is true of crime. The 80,000 risoners constantly supported in the nited States are recruited not evenly om the general population, but mainly om certain family breeds.[3] Criminality nong "The Jukes" is a rule, among Jonaan Edwards' descendants the exception. ie same is true of mental abilities of difrent kinds. Galton showed that the ominent English judges, statesmen, chan-

cellors, etc., were furnished by certai family lines only, and were not drawi evenly from all families.[4] The same is tru of feeble-mindedness.[5]

Socially Noble and Ignoble Traits

The question as to which traits are de sirable and which traits are undesirabl might seem, on first thought, rather difficul to determine. Few of us would like to hav our neighbor's taste in the matter con stituted as a standard of judgment upon ou own traits. There is one standard of judg ment, however, that is so broad and im personal and so founded on the elements i society to which all individuals are subjec that it can justly serve as a line of divisio between the desirability and undesirability broadly speaking, of individual traits fo perpetuation. This is the measurement b the standard of social worth and servic commonly designated as "fitness."[6] Abov this dividing line may be roughly groupe the geniuses, the specially skilled, th mediocre, who are a help to society, or a least not a detriment. Below this line ma be grouped those feeble-minded, pauper criminals, insane, weak and sick, who are burden, economically and socially. That i a person's traits are desirable of perpetua tion if so balanced as to render the indi vidual a help and not a burden to others.

It must undoubtedly be true that many families possess, inherently, traits of ability which have never had an opportunity to exhibit themselves. This may account for the apparently sudden appearance of great men and women without obvious hereditary background. It is plainly possible, furthermore, to bring about a special combination of two family lines, the mental traits in neither of which exhibit remarkableness, but which, when combined, bring an extremely happy result.

Mental ability does not depend upon education. Education can only enable an individual to utilize more fully his inherent ability; it can not increase inherent capacity. The same is true, of course, of physical capacity. Sandow has an extraordinary muscular ability, developed by certain exercises. Similar exercises will not, however, develop all men into Sandows, no matter how constant their faith and persistent their efforts. Sandow was, probably, hereditarily gifted with a superior muscular capacity, which his exercises have enabled him to fully develop. It is true, however, that few people ever realize their full physical and mental capacities, owing to lack of opportunity, inclination, etc., and that there gen-

erally exist untold possibilities of improvement for those who wish to get the most out of themselves.

A Majority of Sterling Traits

It is apparent that the make-up of an individual is the result of a very complex combination of traits. For this reason, the make-up is not likely to fall heir to all "bad" traits, any more than it is to all "good" traits. Even the feeble-minded, who have fallen heir to such an intensely undesirable trait—or rather, to the lack of intensely desirable traits—in many instances have simultaneously inherited certain desirable traits, such as kindness, gentleness and generosity, often lacking in those possest of scholarly capacities. Many women of the border-line type of feeble-mindedness, where mental incapacity often passes for innocence, possess the qualities of charm felt in children, and are consequently quickly selected in marriage. If a mentally able man possess as an ideal of womanhood other traits than mental capacity, no amount of schooling for his child can make up for the difference between the mental capacity of the offspring of such a mating, and the offspring of a mating with an able-minded woman. Altho the trait of able-mindedness is dominant, so that the mating of an able and a feeble mind will

result in fairly able-minded offspring, who may even be above the average, mentally, such offspring carry in their own germ-plasm the defect derived from their feeble-minded parent, which defect may then be passed on to future generations through the germ-plasm from which their children get their inheritance. A mother's hereditary influence on the child is just as important a factor as the father's, generally speaking. Where feeble-mindedness exists on a family line, care should be exercised by the able-minded members of that line not to mate with another line possessing cases of feeble-mindedness, lest the offspring then fall heir to feeble-mindedness, which can skip a generation. An appreciation of what feeble-mindedness is, and a realization of its inheritability can not help but modify a man or a woman's admiration for the traits or lack of traits which it embraces.

Persons possessing weak physical make-ups may possess strong mental capacities, and vice-versa. Persons of superior mental capacities may lack loftiness of character. It might happen that in so mating as to prevent the perpetuation of an undesirable trait, physical, mental or moral, a desirable trait would be lost along with it. In any

mating transaction, therefore, choice must necessarily compromise upon the favorable hereditary action of a majority of the traits on the two family lines. One must relinquish any quest for perfection. After eliminating the individuals possessing the grossly unsocial traits below the dividing line of social fitness, one must choose with respect to a majority of socially fit traits, in addition to the elements of personal congeniality and affinity. The two last-named elements, however, generally serve as useful narcotics in blinding the mating individuals to the existence of the compromise, and the real becomes the ideal.

Successive Generations and Fraternities

Each trait in the mosaic of one person is transmitted or not transmitted to a child according to the mating of that particular trait—mating with trait or lack of trait—rather than according to the mating of the two persons as a whole. That is, when a man and woman marry and bear offspring, it is not the mating of two units, but it is the mating of myriads of pairs of units—the units being the constituent traits and lack of traits (contained in some mysterious way in the germ-plasm), each trait-mating producing its own trait-offspring. The collection of these trait-offspring makes up the child.

It has been observed that traits differ with respect to their action in mating. Given a specific type of trait-mating, say of a trait with like trait, or trait with the lack of that trait, some types always reappear in the next generations or else are lost entirely from the family line unless reinfused, whereas other types of traits may not reappear in the next generation, but still appear in a generation further removed. Another type of trait is transmissible only by one sex of a family line, and can not be transmitted by the other sex.

From these facts, it is readily understandable how important becomes the consideration of the marriage of relatives, such as cousins,[7] who are, of course, individuals of the same family line, whose mating brings together like groups of traits, thus strengthening the existence of these traits, whether desirable or undesirable. Cousin marriages, when the family possess traits of mental ability, may result in children who are geniuses; but cousin marriages, when the family line possesses traits of mental inability, may result disastrously with respect to offspring. Family lines possessing traits of mental weakness should most assuredly

join only to family lines possessing traits of strength in those regards.

In calculating the inheritability of traits, it is also necessary to consider that certain physical, mental and moral traits flower at the arrival of certain ages only. It is necessary to look along the whole line of a life, as traits may exist at one age and not at another. A boy's beard does not appear until puberty. Likewise, other physical and mental and moral traits sometimes do not manifest themselves until specific ages, according to the type of the family breed. The fact that a parent dies before the development of the trait does not preclude its transmissibility to his offspring. Huntington's chorea, an extremely undesirable trait, does not develop until middle life, but is transmissible to offspring even tho the father dies from some other cause before the period when the disease in his own person would be expected to appear.

Results of Specific Matings

We can best understand the laws governing the inheritance of traits by taking a few concrete cases. The first case is that of an Andalusian fowl. We shall consider the two species, pure bred black and pure bred white, and confine ourselves to observing the inheritance of the single characteristic,

Andalusian Fowl

plumage *color.* Of course, as long as the black mate only with the black their children will be black, and as long as the white mate with white the children will be white. But if a white mates with a black, the children will not be either black or white, but blue. All will be blue. But the most interesting facts appear in the next generation, when these hybrid blue fowls mate with black or white, or with each other. The original of the cross between the white and the black is, we have seen, an entirely new color, blue, which may be considered a sort of amalgam of black and white. But a cross between the blue and the black will not be any new color, but will be either black or blue—and the chances are even. That is, in the long run about half of the children of the blue and black parents will be blue and half will be black. None of the children will be white. So also crossing the blue with the white will result in half of the children being blue and half, white. Still more curious is the result of mating blue with blue. One might imagine hat in this case all the children would be blue, but only half will be blue, while a uarter will be black and a quarter white.

Laws of Chance

These laws are a curious mixture of chance nd certainty. In certain circumstances, as

we have seen, we can predict with certainty that the offspring will be black, white, blue, or whatever the case may be. In other circumstances we can only state what the *chances* are. But these chances can be definitely stated as one in two, one in four or whatever it may be, and where there are large numbers of offspring this amounts to a practical certainty that definite proportions will have this or that color, or other characteristics.

Two parents are like two baskets or bundles of traits from which the child takes its traits at random. In the wonderful play of Maeterlinck's, called the "Bluebird," we are taken to the "land before birth," where the children are waiting to be born, having selected their parents-to-be. Of course, this is only a pleasant fancy, like the advice of Oliver Wendell Holmes to children to choose good grandparents, but it is a useful fancy which will help us to understand the laws of heredity. The child of the Andalusian fowl takes its color from its two parents on the same principle as a lottery in which it would take two beans, white or black as the case might be, from each of two baskets. Every individual is a sort of basket containing millions of pairs of beans, as it were, each

pair pertaining to a particular characteristic. It took one of a pair from each parent and will give one to each child.

Note that there is always a choice offered by a parent between either bean of a pair, altho both beans of the pair may be alike.

With this picture of a bean lottery before us it is very easy to understand how the colors of Andalusian fowls are inherited. When two black fowls mate, the offspring must be black, because in this case each parent basket contains a pair of black beans, so to speak, so that the child taking one black bean from each basket will necessarily draw a black pair. For the same reason the child of two white fowls must be white, but when a black and white fowl mate, the child takes a white bean from one parent and a black from the other, its own color being a resultant or amalgam of the two, which in the case of the Andalusian fowl is blue. Since every such hybrid child has this same combination of a white and a black bean, all these hybrids are alike. All are blue. It is important to remember that this hybrid blue is only a sort of mechanical mixture of black and white, and that the black and white are still separate beans, as it were.

But now suppose a hybrid or blue fowl to

mate with a white. This means that the child takes from the white parent or basket one of the two white beans and from the blue parent or basket, one of the two beans, of which one is white and the other, black; the bean taken from the first or white basket must be white, but that taken from the second or blue or hybrid basket may be either white or black. It is a lottery with an even chance of drawing white or black. In the long run, half of the children will draw white and half, black. Those which draw the white will, since they also drew white from the other parent, be wholly white, but those which drew the black will be blue, since they will have one black and one white bean. We see, too, that the white child is just as truly white as tho it had not had a hybrid parent; for of the two elements or beans which the hybrid carried, the black one was left behind untaken. We see that the blue child is a hybrid exactly like its hybrid parent, and not any new kind of cross between the blue and the white. In short, the children of a blue and white are either the one or the other and not a mixture. In the same way if a blue mates with a black, half of the children will, in the long run, be black and half blue.

Finally we come to the mating of a blue vith a blue. Here the lottery is to pick a ɔean from two baskets, each basket contain-ng both white and black beans, one of each. When at random one is taken from either ɔf these two baskets there is an even chance hat the bean from the father is white or ɔlack and an even chance that the bean from he mother is white or black.

Now, what is the chance that the child lraws a white bean from both baskets? Evi-lently it is one chance in four; for there are our ways equally probable in which it can ake these beans, *viz.:* (1) black from the ather basket and black from the mother; 2) white from the father and white from he mother; (3) white from the father and lack from the mother; (4) black from the ather and white from the mother. So the hildren could draw both white once in four imes, both black once in four, and a white nd a black in the other two cases. And ıat is why from two blue Andalusian fowls, n the average, one-quarter of the children ill be black, one-quarter white, and the ther two-quarters, blue. Again, let us stop ɔ emphasize the fact that the black children f these hybrids are just as pure blooded as ıeir black grandparent, and will mate with

other pure-blooded black in exactly the sam way as tho there had never been any whit in their ancestry. The white strain has bee left behind, or been "bred out."

We have spoken of one character or char acteristic—color. The same laws apply t other characters. Often different character are inherited quite independently of on another. Each of us is a basket or bundl of very many qualities, each quality bein a little compartment of the basket with tw beans in it. As it were, there is a pair o beans for every unit trait, whether tha trait relates to color, to musical ability, o to any one of hundreds of other kinds.

To summarize the laws of inheritance o the unit character called color, in Andalusia fowl, we have really six ways in which w can consider mating of the three colore fowls (black, white, blue): (1) black ma mate with black, in which case all the off spring will be black; (2) white may mat with white, in which case all the offsprin will be white; (3) black may mate wit white, in which case all the offspring wil be blue—a hybrid containing both black an blue elements; (4) blue may mate with black in which case half the offspring will be pur bred black, and half hybrid blue; (5) blu

may mate with white, in which case half the offspring will be white and half blue; (6) blue may mate with blue, in which case a quarter of the offspring will be white, a quarter black, and a half blue.

Guinea Pigs

These results are the fundamental laws discovered by Mendel. But the results are not always as clear as in the case of the Andalusian fowl. In that case the hybrids were not like either parent, but were a new color, blue, so that they were labeled at once and recognizable as hybrids—but this is not generally the case. Take, for instance, guinea pigs. What will be the result of mating an "albino" white with a black guinea pig? Quite exactly the same principle applies as in the case of the Andalusian fowl, but the principle is not as clear to see. All the offspring are hybrid, but they will not be blue: they will be black. They will look like the black parent, yet they will really be different from that parent. The black color predominates, *i.e.*, black is "dominant" over white, while the white recedes out of sight, or is "recessive." This hybrid black guinea pig is like the hybrid blue Andalusian fowl. It is a hybrid, a combination of white and black, but in the guinea pig the black covers up the white so that *nothing* in the color re-

veals the fact that it is a hybrid. Now if the hybrid black offspring of these black and white guinea pigs mate with each other the result will follow exactly the same Mendelian law as applied to the Andalusian fowl. But this will not be so clear, because now we have two kinds of black instead of a black and a blue. One child in four will be *pure bred* black like the grandparent and two out of the four will be *hybrid* black. So to the eye we shall simply have, out of every four children, on the average of one white and three black. But those three black are not all alike. One is a thoroughbred and two are half-breeds.

But how then are we to distinguish between the one pure bred black, the thoroughbred, and the two blacks that are hybrids so that we can be sure which is which? The only way they can be distinguished is to wait to see what their offspring will be in the next succeeding generations.

All thoroughbreds will behave like thoroughbreds. For instance, if mated with white they will have nothing but black children. But if those that are hybrid black mate with those that are white, half of the children will be white; these white children betray the fact that their black parent was a half breed.

Then we can put a tag on that black parent. If proper tags are put on the blacks so as to distinguish between the pure-blooded and the half-blooded—say a blue tag on the hybrids and a black on the thoroughbreds—we shall get exactly the same results as described in the case of the Andalusian fowl, in the six cases mentioned. The same principles apply to qualities of the guinea pigs other than color. Thus, if a long-haired guinea pig mates with a short-haired guinea pig, all the offspring will be short-haired, because short hair is dominant over long hair. Again, if a smooth-coated guinea pig mates with a rough-coated one, the offspring will be rough coated, because a rough coat is dominant over a smooth coat.

"Thorough-bred" Humans

The same principles undoubtedly apply to the human race, altho as yet only a few traits have been carefully studied. Eye color is one of these. Imagine a marriage of a thoroughbred, black-eyed Italian with a thoroughbred, blue-eyed Irish. What will be the result? All the children will be black-eyed, black being dominant over blue; but these black eyes are not the genuine article that the Italian parent possest. They are a blend, and it is only because the black element dominates over or conceals the blue

element that we can not see on the surface that there is any blue there. It may come out in the next generation; for, if these half-blooded individuals marry among themselves one-quarter of their children on the average will be blue-eyed. The other three-quarters will be black-eyed, but only one-quarter will be "really and truly" black-eyed, *i.e.*, black-eyed like the Italian. The remaining half are hybrid black, like the parents. It is only a sort of imitation black so to speak.

The appearance of blue eyes in the second generation is the long observed but formerly mysterious "atavism," or reversion to the grandparent.

Suppose the children of an Italian and an Irish parent intermarry with pure bred Italians. We immediately know what will be the result. All the children will be black-eyed, but among a large number only half will be thoroughbred black-eyed. The other half will be "imitation" black-eyed. The case is just like the mating of hybrid black guinea pigs with thoroughbred black guinea pigs, or of the blue fowl with the black. Similarly, if the Irish-Italian hybrids marry with pure Irish, half the offspring will be blue-eyed and half will be hybrid black-eyed.

Dominants and Recessives

Black eyes are "dominant" over blue eyes because the black color is due to a pigment, while the blue color is due to the absence of this pigment. In general a quality which is due to the presence of some positive element is dominant over a quality due to the absence of that element. A child inheriting from a blue-eyed person simply draws a blank from that side in the lottery.

In order to understand how these principles of Mendel apply in any given case we need first to know what traits are "dominant" and what are "recessive."

Among traits known to be "dominant" are, besides pigmentation of the eye, certain peculiarities of the skeleton, such as short-fingeredness (two phalanges only on each digit), Huntington's chorea, presenile cataract, congenital thickening of the skin, early absence of hair, diabetes insipidus, stationary night-blindness, liability to periodic outbreak of temper, etc.

Among traits known to be "recessive" are albinism (or lack of pigmentation), a certain degenerative disease of the eye, deaf-mutism, imbecility, insanity of certain types, certain nervous diseases; also certain mental traits, such as musical ability.

Suppose now that a normal or "able-

minded" person, if we may use that term as distinct from feeble-minded, marries a feeble-minded person. Assuming that the "able-minded" person is a "thoroughbred" all of the children will be apparently normal. None will be feeble-minded. "Able-mindedness" is dominant over feeble-mindedness. Yet all these children that seem to be perfectly normal lack something in their germ-plasms. This deficiency can crop out in later generations. If two of these hybrids between the feeble-minded and the able-minded marry each other, in a large group of cases one-quarter of the children will be feeble-minded, one-quarter thoroughbred able-minded, and the remaining half, tho apparently able-minded, will carry the deficiency in them just as their parents did. They are half-breeds. On the other hand, if two feeble-minded people marry, all of the children will be feeble-minded. Certainly we can and ought to forbid and prevent such marriages.

But feeble-mindedness is a recessive quality, so that if the feeble-minded marry only with normal individuals, the feeble-mindedness does not show itself in the next generation, and if these apparently normal children of such marriages take pains to marry really

normal individuals, avoiding not only the feeble-minded but even those who like themselves have feeble-mindedness on one side of their family tree, there will be no feeble-mindedness cropping out in future generations.

Instances of Eugenic Improvement

But not all human abnormalities are recessive. Thus, as has been said, Huntington's chorea is dominant, so that every child of the unfortunate victim of this malady will contract it when it reaches the right age. Marriages of such people should, therefore, never be allowed, even with normal individuals.

It is not to be understood that the mendelian hypothesis is a complete explanation of all the phenomena of heredity, yet it points the way to practical and effective reform in human as well as animal breeding.

But when we propose to restrict marriages or mating of those unfit to marry, people are apt to say, "That is a dream. It can't be done." But it can be done and it has been done. Every one has heard of the cretins in Switzerland. They are a kind of idiot who are short in stature and afflicted in all cases with goitre in the neck. Of course, many people have goitre who are not cretins, but there is no cretin who has not goitre. These

cretins are peculiarly a feeble-minded people. They are common still in many towns of Switzerland; they are loathsome objects, helpless as children, with silly smiles, unable to take care of themselves in even the simplest toilet ways, and have to be looked after like domestic animals, or even more closely.

A gentleman very much interested in Eugenics visited Aosta, in Italy, just outside of Switzerland, once in 1900 and again in 1910. In 1900 he found many of these creatures among the beggars in the streets, in the asylums, in the home, in the orphan asylum—everywhere he ran across these awful apologies for human beings. But in 1910 he found only one! What had happened? Simply that a few resolute, intelligent reformers had changed the entire situation. An isolation institution, or rather two institutions, one for the men and the other for the women, were established. In these the best care of the inmates was taken as long as they lived, and such people do not live long. But pains were taken to see that by no possibility could marriage or mating of those people take place. They forfeited any such rights in return for the care that they received from the State.

Thus is it possible to apply the laws of ieredity as laid down by Mendel in a horoughly practical way and to get results *mmediately* in one short generation. It seems, and it is, a colossal task to change iverage human nature one iota. Yet in the ight of modern eugenics we could make a iew human race in a hundred years if only people in positions of power and influence would wake up to the paramount importance of what eugenics means. And this could be done quietly and simply without violence to existing ideas of what is right and proper. It could be done by segregation of the sexes for defectives, feeble-minded, idiots, epileptics, insane, etc. By this kind of isolation we can save the blood-stream of our race from a tremendous amount of needless contamination.

And it is being done. The growing tendency to put defectives in institutions, tho originally with no such object, will reduce the transmission of defects, especially when it is recognized that the sexes must be separated and that the inmates should be kept at the institution through the reproductive period of life.

Educational Influence

It is inconceivable that the average individual will deliberately and consciously make

his calculations regarding the character of possible offspring before he allows himself to fall in love to the point of desiring marriage. Yet unconsciously an educational influence on love and on marriage selection has been operating through centuries. The sick, the feeble-minded, the immoral, and members of their families, have at all times been socially handicapped, and have always been the first to be eliminated in marriage selection. And it is conceivable that this already developed wisdom in mate-choosing can easily be augmented by a further knowledge of heredity which is now available. It unconsciously favorably modifies the individual taste.

Certain races of men, without consciousness of their action, have varied in the character of their choices (sex selection) in such a way as to bring about varied conditions in their races, with respect to resistance to disease, of mental capacity and to moral quality. The Mongolian differs from the Hebrew, the Anglo-Saxon differs from the African.

It depends largely upon the action of those now upon the earth, who are now making their choices of marriage, as to whether the races of the future shall be

physical, mental or moral weaklings, or whether they shall be physically brave and hardy, mentally broad and profound, and morally sterling.

To summarize: There are four main lines along which eugenic improvement of the race may be attained: Summary

(1) Education of all people on the inheritability of traits and the consequent development of higher and more intelligent ideals of marriage; (2) segregation of defectives so that they may not mingle their family traits with those on sound lines; (3) sterilization of certain gross and hopeless defectives, to preclude the propagation of their type; (4) marriage laws consonant with the principles of Eugenics.

There would seem to be great need of State Eugenic Boards, to correlate and to promote these activities, in the interest of the future population, and to give expert advice as to how to legislate wisely, and individual advice as to how to mate wisely. The latter function now falls entirely upon the Eugenics Record Office at Cold Spring Harbor, under the Carnegie Institute of Washington, where the work is being carried on with great efficiency with the funds at command.

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